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AUTOMATED PROBABILITY FORECASTS OF CEILING AND VISIBILITY BASED ON SINGLE-STATION DATA

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National Weather Service

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AUTOMATED PROBABILITY FORECASTS OF CEILING AND VISIBILITY BASED ON SINGLE-STATION DATA

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FINAL REPORT

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16. Abstract
A set of computer programs was developed to produce multiple linear regression equations for predicting the probability of specified ceiling and visibility categories at air terminals. The equations were based upon weather observations made solely at the terminal and were derived with the REEP screening technique from 329 possible predictors. The program(s) accepted raw data in a standard National Climatic Center format, and a complete set of prediction equations for five time projections was produced for each of 50 stations in a single computer run.

The accuracy of forecasts generated by the equations was evaluated for 20 terminals. Three measures of accuracy were used to compare the objective forecasts to persistence and climatology. The equations were superior for the P-score and the Allen utility score, but for percent correct, persistence was better than the equations for the 4-hour forecast and climatology was about as good as the equations at 10 and 16 hours. The equations for the same 20 terminals were also examined to determine the relative importance of the predictors.

Computer programs were developed to prepare forecasts on an operational basis for 20 terminals in the eastern U.S. and 23 terminals in Alaska. The National Meteorological Center is prepared to issue forecasts for the 20 terminals, while the Alaska region is preparing to issue the 23 terminal forecasts at the forecast center in Anchorage. One program was written for John F. Kennedy Airport for a time-shared computer system.

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INTRODUCTION

This report describes an effort carried out by the National Weather Service (NWS), with funding support from the Federal Aviation Administration (FAA), to develop an improved technique for the prediction of ceiling and visibility. The objective of the effort was to:

(1) Develop equations for predicting the probability of occurrence of specific categories of ceiling and visibility for time projections of 3, 6, 9, 12 and 15 hours for a specified list of air terminals.

(2) Develop the necessary computer programs to operationally implement the prediction equations.

The probability forecasts were to be based only on surface observational data from the terminal for which the forecast was made and were to be produced within one hour after observation time. The prediction equations were to be devised and tested with the approach discussed in Report Number FAA-RD-70-26 (Allen, 1970).

In developing the required equations, the statistical technique of screening regression was used. From a large set of possible predictors, a subset was chosen by a screening algorithm for a group of predictand categories. The chosen predictors for each given predictand became variables in a mathematical expression referred to as a "single-station" equation. For each terminal, a unique set of single-station equations was derived.

The original work along these lines began with the efforts of Enger, et al. (1962), at the Travelers Research Center. Subsequent investigations by Miller (1964) and Enger, et al. (1964), demonstrated the feasibility of the method in producing forecasts of approximately the same accuracy as manually-prepared forecasts and the best objective techniques then available.

The REEP (Regression Estimation of Event Probabilities) procedure was used to develop the prediction equations. In this scheme, the predictors and predictands are binary, i.e., they can take on values of 0 or 1 only; if the value of a particular element is within a given range, the corresponding predictor is set to 1; otherwise, it is set to 0. The regression equations are developed stepwise, successively selecting the best predictors from a large number available. This screening of predictors continues until some predetermined number of predictors is selected or until none of the remaining predictors would improve the relationship adequately.

Allen (1969) continued exploring the basic approach and designed an operational test of the method under field conditions. At this stage in the development, equations were derived by screening possible predictors from not only the terminal under investigation but also from 10 to 14 terminals

in the surrounding area; the results were called "network" equations. Equations for eight major terminals were developed, and forecasts were generated in real time at a central computer site and provided to forecasters responsible for the issuance of official, manually-prepared forecasts. In order to determine their contribution to forecast improvement, the objective forecasts were timed to reach the field after the subjective forecasts had been prepared but sufficiently in advance of filing deadlines. The forecaster was therefore able to examine the objective forecast and modify his original forecast dependent upon the later information. For a period of seven months, objective forecasts were prepared every six hours and transmitted to the field forecasters. Records were kept in the field of the original objective and subjective forecasts and modified subjective forecasts. Comparative verification of the three types of forecasts indicated that the objective forecasts were of some value as guidance in preparing terminal forecasts, but their value was small and irregular with respect to the forecasting of low ceiling and visibility conditions in difficult weather situations. It was suggested that these results were due mainly to the use of simple predictors in the equations and that using more sophisticated predictors would lead to improved forecasts. The experiment did demonstrate, however, the practicalities of computing and distributing automated forecasts from a central location.

Because of the relatively high data and computer costs involved in developing network equations, Allen (1970) conducted an experiment in which equations were developed by screening possible predictors derived from variables observed at only the terminal in question. These single-station equations were developed and tested for four terminals. In developing the equations, screening was performed on 339 variables including both simple and compound (Boolean) predictors. The latter were composed of two or more simple predictors connected by the logical operators "And" and "Or". Boolean predictors were used to model physically meaningful relationships which cannot be described by simple predictors alone.

Allen compared the single-station equations for the four terminals with network equations developed for the same terminals in the earlier experiment. The evaluation was achieved by comparing the respective reductions of variance attained during the derivation of equations for each system. The results showed the network equations to be slightly superior but not enough so to justify the significantly higher costs involved in developing equations for a large number of terminals. Based on this comparison and the findings of the earlier work, it was decided to expand the single-station equation project and develop equations for a large group of U.S. terminals.

DEVELOPMENT OF SINGLE-STATION EQUATIONS

Discussions between the FAA and the NWS led to a decision to develop single-station equations for (1) 20 terminals which were receiving official NWS forecasts (FT's) and which were being treated by the NWS in a parallel effort --under the same Interagency Agreement--to develop prediction equations utilizing parameters output by certain numerical models; the results of this latter effort were called MOS (Model Output Statistics) equations (Bocchieri

Table 1. Terminals Selected for the Development of Single-Station Equations

(a) Terminals in the NWS FT Program	(b) Terminals not in the NWS FT Program
1. Albany, N. Y.	1. Bedford, Mass.
2. Atlanta, Ga.	2. Jackson, Miss. (Hawkins Field)
3. Baltimore, Md.	3. Greenville, S.C.
4. Buffalo, N. Y.	4. Middletown, Pa.
5. Nashville, Tenn.	5. Moses Lake, Wash.
6. Boston, Mass.	6. Spartanburg, S.C.
7. Birmingham, Ala.	7. Idaho Falls, Id.
8. Cleveland, Ohio	
9. Cincinnati, Ohio	
10. Washington, D.C. (National)	
11. New York, N.Y. (Kennedy)	
12. New Orleans, La.	
13. Chicago, Ill. (Midway)	
14. Pittsburgh, Pa.	
15. Raleigh-Durham, N.C.	
16. Savannah, Ga.	
17. St. Louis, Mo.	
18. Louisville, Ky.	
19. Tallahassee, Fla.	
20. Knoxville, Tenn.	

and Glahn, 1972), (Bocchieri et al., 1973). The intent was to compare the two prediction systems, as well as a third system--a hybrid which would combine the best aspects of the two; and (2) 7 terminals which were not receiving FTs. The 27 terminals selected for equation development are shown in Table 1.

The single-station equations were to be developed such that forecasts of ceiling and visibility would be available for the terminals listed in Table 1(b) for 3, 6, 9, 12, and 15-hour projections, and for the terminals listed in Table 1(a) for 4, 7, 10, 13, and 16-hour projections. The projections for the latter group were selected to allow field forecasters sufficient time to use the objective forecasts as guidance material in the preparation of FTs and still meet filing deadlines.

It was also necessary that improved computer programs be developed to derive single-station equations. The programs used in the previous effort were appropriate to that experimental work. However, they were written for a now obsolescent computer and required extensive human intervention. Furthermore, the original programs were designed to handle data that required considerable preliminary processing. Therefore, a new set of programs was developed which performs the following operations:

(a) Process hourly surface observations input in the standard format of the National Climatic Center. A subprogram reads the data, checks for missing and erroneous entries, tests for meteorological and chronological consistency, and finally converts the data into binary or "dummy" form. This procedure examines 13 elements of each observation and, for each element, determines if its value satisfies the criteria for each of a number of dummy variables. 162 observation dummies are associated with observed elements as shown in Table 2.

Table 2. Observational Elements From Which Dummy Variables Were Defined

Element	Unit of Measurements	Number of Observation Dummies
Ceiling Height	feet	9
Prevailing Visibility	miles	10
Wind Direction	16 compass points	17
Wind Speed	knots	9
Weather	types	12
Dry Bulb Temperature	°F	13
Dew Point Temperature	°F	5
Sea Level Pressure	mb	5
Total Cloud Amount	tenths	4
Relative Humidity	%	6
Lower Sky Cover	classes	9
Time of Day	Local Standard	31
Day of Year	Julian days	32
Total		162

(b) Transform the observation dummy variables into 417 "event" dummy variables. This procedure combines the 162 dummy variables for a given observation with the dummy variables derived from the three preceding hourly observations. In this manner, an event is created linking current and previous weather observations.

(c) Transform the 417 event dummies into the 329 predictors which are screened during the derivation of equations. The 329 predictors are listed in appendix A. The transformation is accomplished by treating some individual event dummies as predictors and by combining some event dummies to form compound (derived) predictors. For example, predictor number 273 is set to 1 (true) if the visibility is not currently greater than 4 miles and the wind direction is between SW and WNW (incl.) and the weather is rain or rain showers or drizzle or freezing rain.

(d) Develop prediction equations, automatically selecting the most promising predictors from the 329 available. A separate equation is obtained for each of five categories of ceiling and visibility (the predictands), to be obtained by introducing each of the available variables into the regression. It then selects the best one and puts it into the regression, computing the appropriate coefficients. This process is iterated until 30 predictors are in the regression. Since the input predictands are either 0 or 1, the equations obtained give the probabilities of occurrence of the several categories.

The computer program set accomplishes steps (a) through (d) and produces 50 regression equations (5 categories X 5 time projections X 2 weather elements) for a station; fifteen minutes of central-processor-unit (CPU) time on a CDC 6600 are required if the input record is ten years long. In operational practice, each of the equations is evaluated to produce a forecast.

The form of each equation is:

$$F_y = a_o + a_1 X_1 + a_2 X_2 + \dots + a_{30} X_{30}$$

where F_y is defined as the probability of occurrence of the event y given the conditions represented by the 30 selected predictors X_i; a_o through a_n are coefficients. In practice, since the predictors are binary, the value of any F_y is calculated by adding the coefficients associated with predictors whose value is 1.

The predictand categories which were chosen for this effort are shown in Table 3. For each time projection and for each element to be forecast (ceiling and visibility), five equations were derived--one for each of the predictand categories shown in Table 3. For a given element, the predictors in all five equations are identical but the coefficients are unique. Table 4 illustrates this principle in showing a portion of the 4-hour ceiling prediction equations for Albany, N. Y.

Table 3. Definition of the Ceiling and Visibility Predictand Categories

Category	Ceiling (Feet)	Visibility (Miles)
1	$\leq$ 100	$\leq$ 3/8
2	200 - 400	1/2 - 7/8
3	500 - 900	1 - 2 1/2
4	1000 - 1900	3 - 4
5	$\geq$ 2000	$\geq$ 5

Table 4. 4-Hour Ceiling Prediction Equation for Albany, N.Y.

Predictors	Predictor Coefficients for Predictand Categories				
	1	2	3	4	5
Constant	.001	.039	.088	.202	.669
1. Ceiling at $t_o \geq$ 2000 ft	.001	-.037	-.087	-.196	.320
2. Ceiling at $t_o \leq$ 400 ft	.016	.177	.009	-.162	-.040
3. Total cloud cover at t_o > .9	-.002	.004	.018	.038	-.058
4. Time of day 22-03L <u>and</u> RH at $t_o \geq$ 90% <u>and</u> weather at t_o fog <u>or</u> ground fog <u>or</u> haze <u>or</u> smoke	.054	.042	.000	.005	-.102
. . .					
30. At t_o, ceiling 500-900 ft <u>and</u> wind direction NNE-ESE <u>and</u> RH $\geq$ 80%	.040	-.051	.000	-.037	.047

The final set of 329 possible predictors, which was screened for each terminal, is listed in Appendix A. This standard set of predictors was used to minimize the amount of data processing required prior to each screening run; the predictors are applicable in any season, at any time of day, and for any terminal.

The list is composed of both simple and Boolean predictors and is the result of a major effort to represent several types of initial information. With respect to simple predictors, it had been found that the initial value of individual elements in the observation--especially the initial ceiling and visibility--can be a strong indicator of future conditions, at least for short time projections. On the other hand, combinations of simple predictors were developed in order to specify certain types of initial conditions that might presage low ceilings or low visibilities, or any other range of the predictands. Some predictors were based on changes in ceiling, visibility, wind, or other variables during the last three hours before forecast time. A large number of predictors were included to represent different times of day and seasons in combinations with the initial ceiling or visibility. All parts of the country were considered in this development, insofar as local forecasting experience was known or had been published.

For the derivation of equations, a data base consisting of 10 years of hourly surface observations (about 88,000) for each terminal was used whenever possible; however, a minimum of 5 years of data was required for a terminal to be considered for equation development. The most commonly used time period for the data base was from January 1, 1955 through December 31, 1964; the period of record of the data base for each terminal is shown in Appendix B. In all cases, the data were obtained from the National Climatic Center in Asheville, N.C. and were supplied on magnetic tape in the TDF 1440 format.

The computer programs which generate prediction equations from hourly climatic data are available at the NWS.

MEASURES OF PREDICTION EFFECTIVENESS

It was also required that the NWS provide a set of verification and evaluation measures for the prediction equations. Since the equations are to be used to produce forecast guidance for airways forecasters, the effectiveness of the guidance is the extent to which it improves the weather forecasts that reach the aviation user. A direct measure of improvement would have required an extensive, controlled experiment to evaluate the difference between forecasts made--under operational conditions--with and without the guidance. Such an experiment was not feasible within the resources available; however, by FAA/NWS agreement, it was decided to evaluate several characteristics of the guidance that, to a large extent, determine its effectiveness:

1. Accuracy
2. Timeliness
3. Ease of Interpretation
4. Repeatability

Accuracy

Since the forecast guidance is in terms of probabilities, the appropriate measure is the P-score (Brier, 1950)[1]. It is essentially the mean square error of a set of probability forecasts. Because it is strongly influenced by the frequency of occurrence of the several categories of ceiling or visibility, the score of the climatological probability forecast is used as a norm and the accuracy of the forecast is expressed in percent improvement over climatology. Thus, accuracy for each set of forecasts is represented by the expression

$$\frac{P\ (\text{clim}\ ) - P\ (\text{fcst})}{P\ (\text{clim}\ )} \cdot 100$$

Timeliness

It is necessary that the guidance be in the hands of the aviation forecaster when he can make the best use of it in his forecast. In planning the development of the prediction equations, timeliness of the ultimate guidance product was considered essential; the guidance should be in the hands of the forecaster an hour before he must issue his forecast. Significant increase of the lead time would, of course, reduce the accuracy of the forecast. Although the system is designed to produce the guidance on schedule, computer and communications failures may cause the delay or loss of some guidance issuances. Therefore, timeliness (and dependability) will be measured by the percent of guidance issuances that reach the forecaster one hour before he must complete his forecast.

Ease of Interpretation

The forecast guidance product is a statement of probabilities of the several categories of ceiling and visibility. As with all new forecast guidance, the field forecasters will be furnished background information so that they may properly interpret the guidance. In this connection, explicit provision will be made for inquiries if the forecasters require additional information. Also, a representative sample of forecasters will be surveyed to determine whether the format of the message containing the guidance is satisfactory. Ease of interpretation will be considered satisfactory if and when all significant questions are resolved and 80% of the forecasters are satisfied with the format.

Repeatability

Identical inputs will produce identical forecast guidance. (Note that the time and date of the observations are part of the input). Since complete repeatability is inherent in the system, no measure of repeatability is necessary.

[1] See Appendix F for an explanation of all verification methods used in this report.

ANALYSIS AND VERIFICATION OF THE EQUATIONS

Following their derivation, the equations for the 20 terminals shown in Table 1(a), were examined in three ways: (1) an analysis of the predictors chosen; (2) a verification of the equations with independent data; and (3) an attempt to determine the optimum number of predictors to be included in each equation.

The analysis of predictors was conducted to summarize: (a) the order of selection of predictors, with respect to elements and projections, by individual terminals; (b) the frequency of selection of each of the 329 possible predictors for the 20 terminals as a group; and (c) the manner in which predictors were selected for elements and projections with respect to each of the 329 possible predictors.

Analysis (a) consisted of a summary, by individual terminals, of the predictors in each derived equation for a given element and projection. The summary, which is presented in Appendix C, lists the 30 predictors included in each equation; the predictors are listed in the order in which they were selected during the screening process. For any given element and projection, the same predictors appear in all 5 predictand category equations but for a given predictor the coefficients will vary from equation to equation. Due to space limitations, the coefficients have been omitted from Appendix C.

In analysis (b), the number of times each of the 329 predictors was selected during the derivation of equations was calculated. The maximum number of times a predictor could have been selected was 200--if it were included in every element and projection equation for all 20 terminals. In actuality, the greatest number of times any predictor was selected was 188. The most frequently chosen predictor was total cloud amount at t_o (TCA_o) covering more than 9/10 of the sky. The second most frequently chosen predictor was present weather (WEA_o) observed as either rain or freezing rain or sleet--it was selected 129 times. The third, fourth, and fifth most frequently chosen predictors--each was selected more than 100 times--were, respectively:

(3) Sea-level pressure at t_o less than 1010 mb

(4) Time of day 16-01 LST and present ceiling below 500 ft and either present relative humidity greater than 89% or present weather observed as drizzle.

(5) Time of day 22-03 LST and present relative humidity greater than 89% and present weather observed as either fog or ground fog or haze or smoke.

A summary of analysis (b) is presented in two ways: (1) the number of times each predictor was selected appears in parentheses in Appendix A following each predictor number, and (2) the 100 most frequently chosen predictors are shown in Appendix D.

In analysis (c), each of the 329 possible predictors was examined to determine the manner in which it was selected--if at all--with respect to both elements, all projections, and screening cycle, summarized for all terminals. Only predictors which were chosen at least 40 times are shown in Appendix E. The summary for each predictor is arranged to permit rapid evaluation of its importance at a particular terminal or to a particular projection.

From an independent set of data forecasts for 4, 10 and 16 hours were generated with the equations for the terminals in Table 1(a) and verified with respect to three scores; the results were then compared to persistence and climatology. The data consisted of surface observations at each terminal for 0500, 0600, 0700, and 0800 GMT for each day during the period October 1, 1970 to March 31, 1971. For the projections used, the forecasts were valid at 1200, 1800, and 0000 GMT.

The results of the verification, which are shown in Table 5, indicate that, in general, the single-station equations produced the best forecasts. The exceptions were for the 4-hour forecast where persistence scored the highest for percent correct (all categories), and the 16-hour forecast, where the objective technique was tied with climatology for percent correct (all categories). It should be noted, however, that the Brier P-score is normally the standard measure for probability forecasts; by this measure the objective technique was the best of the three verified. In terms of percent improvement over climatology by the forecasts as measured by the P-score (see previous section), the objective technique again displayed skill; results are presented in Table 6. For this verification, climatology was defined as the relative frequency of each predictand category during the one year season specified above.

In order to determine the effects of reducing the number of predictors in the equations, a second test was conducted with independent data. The test consisted of generating forecasts for the winters (October 1 - March 31) of 1967-1971 with equations containing from 3 to 30 predictors, in multiples of 3 predictors. The independent data sample was identical in its makeup (i.e. surface observations for 0500-0800 GMT) to that used in the previously described verification; the projections used and the verification scores used were likewise identical.

The scores for the comparative verification of ceiling forecasts are shown in Table 7 and indicate general improvement with an increase in the number of predictors; it can be seen, however, that the amount of improvement became small when the number of predictors approached 30. The results for visibility forecasts were similar. The conclusion was reached that using more than 30 predictors could not be justified, but, since some improvement was attained up to that point, the number of predictors should not be reduced either.

Table 5. Independent Data Verification of Objective Forecasts, Persistence and Climatology

Projection	Technique	Verification Score			
		Brier P-Score	Allen Utility Score	Percent Correct All Categories	Percent Correct Lowest 4 Categories
(a) Ceiling					
4-Hr	Objective	.303*	505*	78.0	44.5*
	Persistence	.418	480	79.1*	43.0
	Climatology	.498	299	75.1	-
10-Hr	Objective	.304*	435*	78.7*	27.1*
	Persistence	.536	390	73.2	21.6
	Climatology	.428	315	78.6	-
16-Hr	Objective	.254*	383*	84.1*	20.0*
	Persistence	.556	347	72.2	11.7
	Climatology	.317	325	84.1*	-
(b) Visibility					
4-Hr	Objective	.307*	452*	78.8	37.9*
	Persistence	.414	429	79.3*	35.7
	Climatology	.449	303	77.5	-
10-Hr	Objective	.250*	385*	84.5*	27.3*
	Persistence	.474	350	76.3	14.4
	Climatology	.309	323	84.5*	-
16-Hr	Objective	.216*	371*	87.1*	33.3*
	Persistence	.476	333	76.2	9.4
	Climatology	.258	332	87.1*	-

* indicates best score

Table 6. Improvement Over Climatology by Objective Forecasts with Independent Data

Projection	Element	Percent Improvement Over Climatology
4-Hr	Ceiling Visibility	39.2 31.6
10-Hr	Ceiling Visibility	29.0 19.1
16-Hr	Ceiling Visibility	19.9 16.3

IMPLEMENTATION FOR OPERATIONAL USE

In order to make forecasts with the prediction equations for a given terminal, the four most recent hourly airways weather reports for that terminal are required as basic input. These must be processed into observation dummies and then into event dummies and finally into dummy predictors in the set of 329 used in the development. However, not all of the 329 need be generated, but rather only that subset of 329 actually selected in the REEP equations for that station. The forecasts are then obtained by summing those coefficients associated with predictors having a value of 1 (true).

The work involved requires the use of a computer to make the forecasts even for a single station. Since the large number of constants involved and the differences in the equations from station to station make the preparation of an implementation program for each station a large task, it was decided to develop a computer program which would generate another program or subroutine to make the forecasts for each station.

The implementation program generator is a program for the CDC 6600 that accepts, as input, the definitions of the various dummies and the REEP equations for a given station and generates as output a computer program that will produce the forecasts for that station. The first version of the program generator produced programs for use on a time-shared computer system.

The computer program to make forecasts for JFK (Kennedy International Airport, New York) on a time-shared system was implemented in the spring of 1971 and was made available to forecasters in New York. However, since the time-shared system had no other access to weather data, the individual observations had to be entered manually. Although the program minimized the work required to enter the data, the New York forecasters made little use of the system and supported the other approach--computation of the forecasts at the National Meteorological Center with automated distribution

Table 7. Comparative Verification of Ceiling Forecasts Generated from Equations with Variable Numbers of Predictors, Winters of 1967-71.

Number of Predictors	Verification Score		
	Brier P-Score	Percent Correct	Allen Utility Score
(a) 4-Hr Forecasts Verifying at 1200 GMT			
0	.3792	77.82	437
3	.2905	79.24	625
6	.2849	79.20	631
9	.2834	79.33	631
12	.2820	79.39	634
15	.2796	79.63	641
18	.2783	79.73	643
21	.2775	79.79	646
24	.2760	79.77	646
27	.2754	79.88	648
30	.2751	79.77	649
(b) 10-Hr Forecasts Verifying at 1800 GMT			
0	.3185	81.71	454
3	.2687	81.82	553
6	.2656	81.91	559
9	.2645	81.91	557
12	.2632	81.89	559
15	.2623	81.94	560
18	.2620	81.97	561
21	.2615	81.98	563
24	.2607	81.96	563
27	.2604	81.97	564
30	.2596	82.06	567
(c) 16-Hr Forecasts Verifying at 0000 GMT			
0	.2578	85.72	441
3	.2353	85.72	500
6	.2335	85.74	505
9	.2324	85.74	508
12	.2324	85.74	508
15	.2310	85.75	511
18	.2306	85.73	511
21	.2304	85.73	512
24	.2302	85.72	512
27	.2301	85.74	513
30	.2300	85.70	514

to the field.

A second version of the implementation generator was developed by modifying the first. This version produces programs that can be run on an IBM 360 computer. A separate subprogram applies to each station and a main program fetches the required observations from the National Meteorological Center's IBM 360 data bank and calls on the subprograms to make the forecasts from the appropriate set of observations. The National Weather Service will issue single-station forecasts for the 20 stations in Table 1(a) on an experimental basis for approximately six months, beginning in April 1973.

DEVELOPMENT OF EQUATIONS FOR ALASKAN TERMINALS

In the latter part of 1971, the Alaska Region of the National Weather Service became interested in the use of the single-station technique for terminals in their area. The Alaska area has some unique forecasting problems, and, since many techniques used in the contiguous U.S. which employ the output of numerical models are not adaptable for use in Alaska, the single-station method appeared to be particularly suitable.

The FAA approved the development of single-station equations for the 23 terminals in Alaska shown in Table 8. A major difference from the earlier work was that one more category was added for both ceiling and visibility. The category modification did not affect the lowest 4 categories but resulted in the following upper 2 categories:

Category	Ceiling (feet)	Visibility (miles)
5	2000-4900	5-6
6	$\geq$5000	$\geq$7

The change was requested by the Alaska Region to make the forecasts more useful in the mountainous regions of Alaska.

The equations are to be implemented operationally by the Alaska Region, and the forecasts will be routinely available at the forecast center in Anchorage for guidance and other applications.

Table 8. Alaskan Terminals for Which Single-Station Equations were Developed

1. Anchorage	9. Cordova	17. Bettles
2. Fairbanks	10. Bethel	18. Kenai
3. Juneau	11. Nome	19. Sheyma
4. King Salmon	12. Kotzebue	20. Kodiak
5. Annette	13. McGrath	21. Barter Island
6. Cold Bay	14. Barrow	22. Adak
7. Sitka	15. Unalakleet	23. Summit
8. Yakutat	16. Northway	

SUMMARY

Multiple linear regression equations were derived for predicting the probability of specified ceiling and visibility categories at 50 terminals. The equations are based upon weather observations at the local terminal only and were derived by using the REEP screening technique on 329 possible predictors consisting of simple and Boolean types. The data base for screening was generated from 5 to 10 years of hourly observations for each terminal. A special computer program was developed which generates the data base and derives the prediction equations in 15 minutes of computer CPU time for each terminal.

The resulting equations for 20 terminals were analyzed to determine the order, frequency, and manner in which predictors were chosen with respect to terminal, meteorological element, and time projection. Forecasts for the same group of 20 terminals were generated and verified with one winter season of independent data. In general, forecasts from the single-station equations were superior to both persistence and climatology.

Equations for the 20 terminals were also evaluated to determine the effects of varying the number of predictors in each equation. Comparative verification of forecasts made from equations containing from 3 to 30 predictors--in multiples of 3--indicated that general improvement resulted by increasing the number of predictors, but that the amount of improvement became small as the predictor maximum was approached.

A special computer program was developed to implement--for operational use--equations for about 20 terminals at the National Meteorological Center in Suitland, Maryland. Equations for 23 Alaskan terminals were made available to the National Weather Service Alaska Region for operational implementation at the forecast center in Anchorage.

CONCLUSIONS

REEP prediction equations, which require only locally-available meteorological information to produce ceiling and visibility forecasts, can be derived with moderate computer and data costs. The equations are adaptable to completely automated procedures and can be used to yield terminal forecasts whenever four consecutive hourly observations are available.

Verification of the prediction equations demonstrated the soundness of the single-station approach. It should be noted, however, that the magnitude of improvement over persistence and climatology was not overwhelming. This result was not unexpected inasmuch as the single-station technique is basically a form of conditional climatology and is therefore inherently limited in skill. This research and development technique provides an interim method for the prediction of ceiling and visibility until improved methods, e.g., outputs of numerical weather models, are available. It is expected that equations combining both numerical and single-station methods will produce forecasts of superior accuracy; indeed, this has already been

indicated in a limited test by Bocchieri et al. (1973). Nevertheless, the single-station prediction technique will continue to have applicability in those areas where numerical prediction products are not available or in operational situations where reliance on numerical products will cause intolerable delays in disseminating a current forecast to the user.

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APPENDIX A

BINARY PREDICTORS SCREENED FOR SINGLE-STATION PREDICTION EQUATIONS

INTRODUCTION

The 329 predictors listed in this Appendix are two-valued variables. Each variable has the value 1 if all the conditions specified in its definition are satisfied, otherwise it has the value 0. Prediction equations are derived by regression screening applied to these predictors.

DEFINITIONS

Each predictor has a serial number which identifies it in the computer screening runs. These identifiers were assigned by Allen (1970) and all those predictors listed by Allen were used in this work except nos. 18-25, 283 and 294 which involved time lags of 12 or more hours.

The weather elements from which the predictors are formed are the following:

- CIG Ceiling in feet above ground
- VIS Prevailing visibility in miles
- WDR Direction of the surface wind
- WSD Speed of the surface wind in knots
- DBT Dry bulb temperature in °F
- DPT Dew point temperature in °F
- RLH Relative humidity in %
- SLP Sea level pressure in mb
- SCL Lower sky condition, amount of sky covered by the lowest cloud layer. See Table A1 below for the code.
- TCA Total cloud amount in tenths of sky covered
- WEA Weather observed at the given hour, in twelve groups. See Table A2 below for definition of the groups.
- DOY Day of year, beginning with 1 for January 1. Each period defined by DOY runs circularly, thus DOY 341 - 80 means the period December 7 to March 21.
- TOD Time of day. This variable is the local standard hour of the latest observation used in making the forecast (forecast time).

The numbers in parentheses immediately following the serial numbers indicate the total number of times each predictor was selected during the screening for prediction equations for the 20 terminals listed in Table 1(a).

The subscript on each predictor component indicates the number of hours lag between the time the variable is observed and the time of the latest data used in the forecast. For example, CIG_{-3} refers to ceiling observed 3 hours prior to forecast time.

The Boolean operators used in defining the predictors are "*" and "+".

* is the symbol for AND

+ is the symbol for OR

Parentheses define the order in which operations must be performed.

Table A1. Code For SCL, Lower Sky Condition

Code Value	Condition
1	Clear
2	Thin scattered or partly obscured
3	Scattered
4	Thin broken
5	Broken
6	Thin overcast
7	Overcast
8	Sky obscured

Table A2. Code For WEA, Observed Weather Condition

Code Value	Weather Indicators
1	None
2	R-, R, R+
3	RW-, RW, RW+
4	L-, L, L+, ZL-, ZL, ZL+
5	S-, S, S+, SP-, SP, SP+, SG-, SG, SG+, IC
6	SW-, SW, SW+
7	T, T+, A, TOR
8	ZR-, ZR, ZR+, IP-, IP, IP+, IPW-, IPW, IPW+
9	F, IF
10	GF
11	BS, BN, BD, BY
12	H, K, D

SINGLE-STATION PREDICTORS

1. (2) $CIG_o \leq 100$
2. (3) CIG_o 200-400
3. (6) CIG_o 500-900
4. (4) CIG_o 1000-1900
5. (71) $CIG_o \geq 2000$
6. (15) $CIG_o \leq 400$
7. (27) $CIG_o \leq 900$
8. (69) $CIG_o \leq 4900$
9. (2) $VIS_o \leq 3/8$
10. (3) VIS_o 1/2-7/8
11. (4) VIS_o 1-2 1/2
12. (3) VIS_o 3-4
13. (42) $VIS_o \geq 5$
14. (4) $VIS_o \leq 7/8$
15. (8) $VIS_o \leq 1\ 3/8$
16. (28) $VIS_o \leq 2\ 1/2$
17. (54) $VIS_o \geq 7$
26. (23) WDR_o CALM
27. (7) WDR_o NNE-E * $WSD_o \leq 5$
28. (10) WDR_o NNE-E * $WSD_o \leq 9$
29. (12) WDR_o NNE-E * WSD_o 4-19
30. (6) WDR_o NNE-E * $WSD_o \geq 20$
31. (3) WDR_o NNE-E * $WSD_o \geq 30$
32. (25) WDR_o NE-ESE * $WSD_o \leq 9$
33. (42) WDR_o NE-ESE * WSD_o 10-29
34. (6) WDR_o NE-ESE * $WSD_o \geq 20$
35. (8) WDR_o E-SSE * $WSD_o \leq 5$
36. (91) WDR_o E-SSE * WSD_o 4-19
37. (1) WDR_o E-SSE * $WSD_o \geq 20$
38. (19) WDR_o SSE-SW * WSD_o 4-9
39. (63) WDR_o SSE-SW * WSD_o 6-19
40. (3) WDR_o SSE-SW * $WSD_o \geq 20$

41. (4) WDR_o SW-W * WSD_o 4-9

42. (6) WDR_o SW-W * WSD_o $\geq$ 10

43. (7) WDR_o W-NW * WSD_o 4-19

44. (15) WDR_o W-NW * WSD_o $\geq$ 10

45. (4) WDR_o NW-N * WSD_o 6-19

46. (36) WDR_o NW-N * WSD_o $\geq$ 10

47. (0) WDR_o NW-N * WSD_o $\geq$ 20

48. (31) DBT_o $\leq$ 29

49. (71) DBT_o 30-44

50. (25) DBT_o 45-64

51. (10) DBT_o $\geq$ 85

52. (0) DBT_o $\geq$ 90

53. (18) DPT_o $\leq$ 29

54. (4) DPT_o 30-39

55. (36) DPT_o $\geq$ 60

56. (22) DPT_o $\geq$ 70

57. (20) RLH_o $\leq$ 49

58. (42) RLH_o $\leq$ 69

59. (19) RLH_o 70-89

60. (5) RLH_o 90-94

61. (48) RLH_o $\geq$ 90

62. (10) RLH_o $\geq$ 95

63. (32) SLP_o $\geq$ 1024.95

64. (115) SLP_o $\leq$ 1009.95

65. (24) SCL_o 1

66. (31) SCL_o 2, 3

67. (8) SCL_o 4, 5

68. (2) SCL_o 6, 7

69. (4) SCL_o 8

70. (0) SCL_o $\leq$ 3

71. (0) SCL_o $\leq$ 5

72. (14) TCA_o < 1

73. (188) TCA_o > 9

74. (33) TCA_o $\leq$ 5

75. (27) WEA. None

76. (5) WEA. R + RW + L + ZL

77. (2) WEA. L + ZL

78. (30) WEA. S + SW + IC + SG + SQ

79. (2) WEA. R * F

80. (2) WEA. (L + ZL) * F

81. (18) WEA. R + ZR + E + EW

82. (129) WEA. R + L + ZL + ZR + E + EW

83. (9) WEA. (R + L + ZL + ZR + E + EW) * F

84. (17) WEA. (S + SW + SP + IC + SG + SQ) * F

85. (13) WEA. F + GF

86. (60) WEA. BS + BD + K + H

87. (21) WEA. RW + SW + T + A + ZR + E

88. (39) (DOY 341-80) * (TOD 2200-0500) * (CIG. ≤ 100)

89. (32) (DOY 341-80) * (TOD 2200-0500) * (CIG. 200-400)

90. (27) (DOY 341-80) * (TOD 2200-0500) * (CIG. 1000-1900)

91. (45) (DOY 341-80) * (TOD 2200-0500) * (CIG. ≥ 2000)

92. (58) (DOY 341-80) * (TOD 2200-0500) * (VIS. ≤ 3/8)

93. (16) (DOY 341-80) * (TOD 2200-0500) * (VIS. 1/2-7/8)

94. (16) (DOY 341-80) * (TOD 2200-0500) * (VIS. 3-4)

95. (41) (DOY 341-80) * (TOD 2200-0500) * (VIS. ≥ 5)

96. (19) (DOY 341-80) * (TOD 0600-1100) * (CIG. 500-900)

97. (11) (DOY 341-80) * (TOD 0600-1100) * (CIG. ≥ 2000)

98. (14) (DOY 341-80) * (TOD 0600-1100) * (VIS. 1-2 1/2)

99. (25) (DOY 341-80) * (TOD 0600-1100) * (VIS. ≥ 5)

100. (4) (DOY 341-80) * (TOD 0200-0700) * (CIG. 1000-2900)

101. (12) (DOY 341-80) * (TOD 0200-0700) * (VIS. 3-4)

102. (34) (DOY 341-80) * (TOD 1200-1700) * (CIG. ≤ 100)

103. (61) (DOY 341-80) * (TOD 1200-1700) * (CIG. 200-400)

104. (8) (DOY 341-80) * (TOD 1200-1700) * (CIG. 1000-1900)

105. (42) (DOY 341-80) * (TOD 1200-1700) * (CIG. ≥ 2000)

106. (34) (DOY 341-80) * (TOD 1200-1700) * (VIS. ≤ 3/8)

107. (7) (DOY 341-80) * (TOD 1200-1700) * (VIS. 1/2-7/8)

108. (27) (DOY 341-80) * (TOD 1200-1700) * (VIS. 3-4)

109. (35) (DOY 341-80) * (TOD 1200-1700) * (VIS$_o$ $\geq$ 5)
110. (38) (DOY 341-80) * (TOD 1600-2100) * (CIG$_o$ $\leq$ 100)
111. (19) (DOY 341-80) * (TOD 1600-2100) * (CIG$_o$ 200-400)
112. (58) (DOY 341-80) * (TOD 1600-2100) * (CIG$_o$ 1000-1900)
113. (44) (DOY 341-80) * (TOD 1600-2100) * (VIS$_o$ $\leq$ 3/8)
114. (13) (DOY 341-80) * (TOD 1600-2100) * (VIS$_o$ 1/2-7/8)
115. (67) (DOY 341-80) * (TOD 1600-2100) * (VIS$_o$ 3-4)
116. (2) (DOY 81-160) * (TOD 2200-0500) * (CIG$_o$ $\leq$ 100)
117. (3) (DOY 81-160) * (TOD 2200-0500) * (CIG$_o$ 1000-1900)
118. (44) (DOY 81-160) * (TOD 2200-0500) * (CIG$_o$ $\geq$ 2000)
119. (2) (DOY 81-160) * (TOD 2200-0500) * (VIS$_o$ $\leq$ 3/8)
120. (2) (DOY 81-160) * (TOD 2200-0500) * (VIS$_o$ 3-4)
121. (42) (DOY 81-160) * (TOD 2200-0500) * (VIS$_o$ $\geq$ 5)
122. (50) (DOY 81-160) * (TOD 0600-1500) * (CIG$_o$ $\geq$ 2000)
123. (47) (DOY 81-160) * (TOD 0600-1500) * (VIS$_o$ $\geq$ 5)
124. (11) (DOY 81-160) * (TOD 1600-2100) * (CIG$_o$ $\leq$ 100)
125. (9) (DOY 81-160) * (TOD 1600-2100) * (CIG$_o$ 200-400)
126. (8) (DOY 81-160) * (TOD 1600-2100) * (CIG$_o$ 1000-1900)
127. (7) (DOY 81-160) * (TOD 1600-2100) * (CIG$_o$ $\geq$ 2000)
128. (7) (DOY 81-160) * (TOD 1600-2100) * (VIS$_o$ $\leq$ 3/8)
129. (10) (DOY 81-160) * (TOD 1600-2100) * (VIS$_o$ 1/2-7/8)
130. (6) (DOY 81-160) * (TOD 1600-2100) * (VIS$_o$ 3-4)
131. (10) (DOY 81-160) * (TOD 1600-2100) * (VIS$_o$ $\geq$ 5)
132. (6) (DOY 161-260) * (TOD 2200-0300) * (CIG$_o$ $\leq$ 100)
133. (0) (DOY 161-260) * (TOD 2200-0300) * (CIG$_o$ 1000-1900)
134. (44) (DOY 161-260) * (TOD 2200-0300) * (CIG$_o$ $\geq$ 2000)
135. (9) (DOY 161-260) * (TOD 2200-0300) * (VIS$_o$ $\leq$ 3/8)
136. (4) (DOY 161-260) * (TOD 2200-0300) * (VIS$_o$ 3-4)
137. (53) (DOY 161-260) * (TOD 2200-0300) * (VIS$_o$ $\geq$ 5)
138. (56) (DOY 161-260) * (TOD 0400-1100) * (CIG$_o$ 1000-1900)
139. (83) (DOY 161-260) * (TOD 0400-1100) * (CIG$_o$ $\geq$ 2000)
140. (47) (DOY 161-260) * (TOD 0400-1100) * (VIS$_o$ 3-4)
141. (61) (DOY 161-260) * (TOD 0400-1100) * (VIS$_o$ $\geq$ 5)
142. (36) (DOY 161-260) * (TOD 1200-1900) * (CIG$_o$ $\geq$ 2000)

143. (21) (DOY 161-260) * (TOD 1200-1900) * (VIS. $\geq$ 5)
144. (12) (DOY 261-340) * (TOD 2200-0500) * (CIG. $\leq$ 100)
145. (47) (DOY 261-340) * (TOD 2200-0500) * (CIG. $\geq$ 2000)
146. (35) (DOY 261-340) * (TOD 2200-0500) * (VIS. $\leq$ 3/8)
147. (23) (DOY 261-340) * (TOD 2200-0500) * (VIS. $\geq$ 5)
148. (50) (DOY 261-340) * (TOD 0600-1700) * (CIG. $\geq$ 2000)
149. (22) (DOY 261-340) * (TOD 0600-1700) * (VIS. $\geq$ 5)
150. (22) (DOY 261-340) * (TOD 1800-2100) * (CIG. $\leq$ 100)
151. (6) (DOY 261-340) * (TOD 1800-2100) * (CIG. 500-900)
152. (0) (DOY 261-340) * (TOD 1800-2100) * (CIG. 1000-1900)
153. (23) (DOY 261-340) * (TOD 1800-2100) * (CIG. $\geq$ 2000)
154. (12) (DOY 261-340) * (TOD 1800-2100) * (VIS. $\leq$ 3/8)
155. (23) (DOY 261-340) * (TOD 1800-2100) * (VIS. 1-2 1/2)
156. (17) (DOY 261-340) * (TOD 1800-2100) * (VIS. 3-4)
157. (9) (DOY 261-340) * (TOD 1800-2100) * (VIS. $\geq$ 5)
158. (8) CIG. $\leq$ 100 * VIS. $\leq$ 3/8
159. (24) CIG. $\leq$ 400 * VIS. $\leq$ 1 3/8
160. (7) CIG. $\leq$ 100 * WSD. $\leq$ 3
161. (7) CIG. $\leq$ 400 * WSD. $\leq$ 5
162. (0) CIG. 1000-1900 * WSD. $\geq$ 20
163. (1) CIG. $\geq$ 2000 * WSD. $\geq$ 20
164. (2) CIG. $\leq$ 100 * WDR. NNE-E * WSD. $\leq$ 9
165. (5) CIG. $\leq$ 400 * WDR. NNE-E * WSD. 6-19
166. (1) CIG. $\leq$ 900 * WDR. NNE-ESE * WSD. $\geq$ 20
167. (8) CIG. $\leq$ 400 * WDR. NE-ESE * WSD. 6-19
168. (1) CIG. $\leq$ 400 * WDR. SSE-SW * WSD. $\geq$ 6
169. (6) CIG. $\leq$ 1900 * WDR. E-SSE * WSD. $\geq$ 6
170. (74) CIG. $\leq$ 4900 * WDR. E-SSE * WSD. $\geq$ 6
171. (2) CIG. $\leq$ 1900 * WDR. S-SW * WSD. $\geq$ 6
172. (26) CIG. $\leq$ 1900 * WDR. SW-W * WSD. $\geq$ 6
173. (2) CIG. $\geq$ 2000 * WDR. SW-W * WSD. $\geq$ 10
174. (0) CIG. $\geq$ 2000 * WDR. W-NW * WSD. $\geq$ 10
175. (87) CIG. $\leq$ 1900 * WDR. W-N * WSD. $\geq$ 10
176. (31) CIG. $\geq$ 2000 * WDR. W-N * WSD. $\geq$ 6

177. (2) $\mathrm{VIS}_o \le 7/8 * \mathrm{WSD}_o \le 5$

178. (0) $\mathrm{VIS}_o \ge 5 * \mathrm{WSD}_o \ge 20$

179. (4) $\mathrm{VIS}_o \le 3/8 * \mathrm{WDR}_o$ NNE-E $* \mathrm{WSD}_o \le 9$

180. (7) $\mathrm{VIS}_o \le 7/8 * \mathrm{WDR}_o$ NNE-ESE $* \mathrm{WSD}_o$ 6-19

181. (10) $\mathrm{VIS}_o \le 7/8 * \mathrm{WDR}_o$ E-SSE $* \mathrm{WSD}_o$ 6-19

182. (1) $\mathrm{VIS}_o \le 2\ 1/2 * \mathrm{WDR}_o$ E-SSE $* \mathrm{WSD}_o$ 6-19

183. (0) $\mathrm{VIS}_o \le 1\ 3/8 * \mathrm{WDR}_o$ SSE-SW $* \mathrm{WSD}_o$ 6-19

184. (2) VIS_o 1-4 $* \mathrm{WDR}_o$ SSE-SW $* \mathrm{WSD}_o$ 6-19

185. (3) $\mathrm{VIS}_o \le 2\ 1/2 * \mathrm{WDR}_o$ SW-W $* \mathrm{WSD}_o$ 6-19

186. (1) $\mathrm{VIS}_o \ge 5 * \mathrm{WDR}_o$ SW-W $* \mathrm{WSD}_o \ge 10$

187. (17) $\mathrm{VIS}_o \le 4 * \mathrm{WDR}_o$ WSW-NW $* \mathrm{WSD}_o$ 6-19

188. (1) $\mathrm{VIS}_o \ge 7 * \mathrm{WDR}_o$ W-NW $* \mathrm{WSD}_o \ge 10$

189. (34) $\mathrm{VIS}_o \ge 5 * \mathrm{WDR}_o$ W-N $* \mathrm{WSD}_o \ge 6$

190. (74) $\mathrm{CIG}_o \le 400 * \mathrm{DPT}_o \ge 60$

191. (54) $\mathrm{CIG}_o \ge 1000 * \mathrm{DPT}_o \le 59$

192. (13) $\mathrm{CIG}_o \ge 2000 * \mathrm{DPT}_o \le 39$

193. (10) $\mathrm{VIS}_o \le 7/8 * \mathrm{DPT}_o \ge 60$

194. (20) $\mathrm{VIS}_o \ge 5 * \mathrm{DPT}_o \le 39$

195. (5) $\mathrm{CIG}_o \le 100 * \mathrm{RLH}_o \ge 90$

196. (26) $\mathrm{CIG}_o \le 400 * \mathrm{RLH}_o \ge 80$

197. (48) $\mathrm{CIG}_o \ge 2000 * \mathrm{RLH}_o \le 69$

198. (6) CIG_o 500-900 $* \mathrm{RLH}_o \ge 80$

199. (2) CIG_o 200-400 $* \mathrm{RLH}_o \ge 80$

200. (8) $\mathrm{VIS}_o \le 3/8 * \mathrm{RLH}_o \ge 95$

201. (3) $\mathrm{VIS}_o \le 7/8 * \mathrm{RLH}_o \ge 90$

202. (1) VIS_o 1/2-7/8 $* \mathrm{RLH}_o \ge 80$

203. (4) VIS_o 1-2 1/2 $* \mathrm{RLH}_o \ge 80$

204. (0) VIS_o 3-4 $* \mathrm{RLH}_o \le 69$

205. (33) $\mathrm{VIS}_o \ge 5 * \mathrm{RLH}_o \le 69$

206. (9) $\mathrm{CIG}_o \le 100 * \mathrm{WEA}_o$ F + GF

207. (6) CIG_o 200-400 $* \mathrm{WEA}_o$ F + GF

208. (8) $\mathrm{CIG}_o \le 100 * \mathrm{WEA}_o$ S + SW

209. (11) CIG_o 200-400 $* \mathrm{WEA}_o$ R + RW + L + S + SW

210. (5) CIG_o 500-900 $* \mathrm{WEA}_o$ S + SW

211. (6) CIG$_o$ 500-900 * WEA$_o$ R + RW + L + S + SW + ZR
212. (2) CIG$_o$ 1000-1900 * WEA$_o$ R + RW + ZR
213. (2) CIG$_o$ 1000-1900 * WEA$_o$ S + SW
214. (15) CIG$_o$ $\geq$ 2000 * WEA$_o$ R + RW + S + SW
215. (32) CIG$_o$ $\geq$ 2000 * WEA$_o$ None
216. (8) VIS$_o$ $\leq$ 3/8 * WEA$_o$ R + L + F
217. (3) VIS$_o$ $\leq$ 3/8 * WEA$_o$ F + GF
218. (7) VIS$_o$ $\leq$ 3/8 * WEA$_o$ S + SW
219. (14) VIS$_o$ $\leq$ 7/8 * WEA$_o$ L + F
220. (22) VIS$_o$ 1 3/8 * WEA$_o$ R + L + S + F
221. (12) VIS$_o$ 1/2-7/8 * WEA$_o$ R + L + S + F
222. (33) VIS$_o$ 1-2 1/2 * WEA$_o$ R + L + ZR + F
223. (7) VIS$_o$ 1-2 1/2 + WEA$_o$ S + SW
224. (7) VIS$_o$ 1-2 1/2 * WEA$_o$ R + RW + L + S + SW + ZR
225. (1) VIS$_o$ 3-4 * WEA$_o$ R + RW + L + ZR
226. (15) VIS$_o$ $\leq$ 4 * WEA$_o$ R + RW + S + SW
227. (20) VIS$_o$ $\leq$ 4 * WEA$_o$ L + F + GF
228. (1) VIS$_o$ $\geq$ 5 * WEA$_o$ R + RW + L + S + SW + ZR
229. (3) CIG$_o$ $\leq$ 100 * WDR$_o$ NNE-E * RLH$_o$ $\geq$ 90
230. (6) CIG$_o$ 200-400 * WDR$_o$ NNE-E * RLH$_o$ $\geq$ 80
231. (15) CIG$_o$ 500-900 * WDR$_o$ NNE-ESE * RLH$_o$ $\geq$ 80
232. (95) CIG$_o$ 200-900 * WDR$_o$ NNE-ESE * RLH$_o$ $\geq$ 80
233. (38) CIG$_o$ $\leq$ 900 * WDR$_o$ NNE-ESE * WSD$_o$ $\leq$ 9 * RLH$_o$ $\geq$ 90
234. (38) CIG$_o$ $\leq$ 1900 * WDR$_o$ E-SSE * RLH$_o$ $\geq$ 80
235. (3) CIG$_o$ $\leq$ 1900 * WDR$_o$ S-SW * RLH$_o$ $\leq$ 69
236. (13) CIG$_o$ $\geq$ 2000 * WDR$_o$ S-SW * RLH$_o$ $\leq$ 69
237. (0) CIG$_o$ $\leq$ 1900 * WDR$_o$ SSE-SW * RLH$_o$ $\geq$ 80
238. (2) CIG$_o$ $\leq$ 1900 * WDR$_o$ WSW-NW * RLH$_o$ $\leq$ 79
239. (4) CIG$_o$ $\geq$ 2000 * WDR$_o$ WSW-NW * RLH$_o$ $\leq$ 69
240. (2) VIS$_o$ $\leq$ 3/8 * WDR$_o$ NNE-E * RLH$_o$ $\geq$ 90
241. (16) VIS$_o$ $\leq$ 1 3/8 * WDR$_o$ NNE-ESE * RLH$_o$ $\geq$ 80
242. (19) VIS$_o$ $\leq$ 1 3/8 * WDR$_o$ E-SSE * RLH$_o$ $\geq$ 90
243. (2) VIS$_o$ 1/2-7/8 * WDR$_o$ E-SSE * RLH$_o$ $\geq$ 80
244. (7) VIS$_o$ 1-2 1/2 * WDR$_o$ E-SSE * RLH$_o$ $\geq$ 80

245. (0) VIS$_o$ $\leq$ 2 1/2 * WDR$_o$ SSE-SW * RLH$_o$ $\geq$ 80

246. (14) VIS$_o$ $\geq$ 5 * WDR$_o$ SW-W * RLH$_o$ $\leq$ 79

247. (13) VIS$_o$ $\leq$ 4 * WDR$_o$ W-N * RLH$_o$ $\geq$ 70

248. (21) VIS$_o$ $\geq$ 5 * WDR$_o$ W-N * RLH$_o$ $\leq$ 69

249. (4) VIS$_o$ $\geq$ 7 * WDR$_o$ W-N * RLH$_o$ $\leq$ 49

250. (6) CIG$_o$ $\leq$ 400 * WSD$_o$ $\leq$ 5 * RLH$_o$ $\geq$ 90

251. (10) VIS$_o$ $\leq$ 7/8 * WSD$_o$ $\leq$ 5 * RLH$_o$ $\geq$ 90

252. (4) CIG$_o$ $\geq$ 2000 * VIS$_o$ $\geq$ 5 * (WSD$_o$ $\geq$ 20 + RLH$_o$ $\leq$ 49)

253. (1) CIG$_o$ $\leq$ 100 * WDR$_o$ NNE-E * WEA$_o$ L + F

254. (12) CIG$_o$ $\leq$ 400 * WDR$_o$ NNE-E * WEA$_o$ R + RW + ZR

255. (5) CIG$_o$ $\leq$ 400 * WDR$_o$ NNE-ESE * WEA$_o$ S + SW

256. (5) CIG$_o$ 500-900 * WDR$_o$ NNE-ESE * WEA$_o$ R + L + S + SW + F

257. (5) CIG$_o$ 1000-1900 * WDR$_o$ NNE-ESE * WEA$_o$ R + L + S + SW + F

258. (19) CIG$_o$ $\leq$ 400 * WDR$_o$ NE-SE * WEA$_o$ R + L + S + F

259. (9) CIG$_o$ 500-900 * WDR$_o$ NE-SE * WEA$_o$ R + L + S + F

260. (7) CIG$_o$ $\leq$ 400 * WDR$_o$ SSE-SW * WEA$_o$ R + L + S + F

261. (5) CIG$_o$ 500-900 * WDR$_o$ SSE-SW * WEA$_o$ R + L + S + F

262. (7) CIG$_o$ $\leq$ 1900 * WDR$_o$ SW-NW * WEA$_o$ R + RW + S + SW

263. (3) CIG$_o$ $\geq$ 2000 * WDR$_o$ SW-NW * WEA$_o$ None

264. (3) VIS$_o$ $\leq$ 3/8 * WDR$_o$ NNE-E * WEA$_o$ L + F

265. (10) VIS$_o$ $\leq$ 7/8 * WDR$_o$ NNE-ESE * WEA$_o$ R + L + ZR + F

266. (23) VIS$_o$ $\leq$ 7/8 * WDR$_o$ NNE-ESE * WEA$_o$ S + SW

267. (5) VIS$_o$ 1/2-7/8 * WDR$_o$ NNE-ESE * WEA$_o$ R + L + S + ZR

268. (10) VIS$_o$ 1-2 1/2 * WDR$_o$ NNE-ESE * WEA$_o$ R + L + S + ZR

269. (94) VIS$_o$ $\leq$ 4 * WDR$_o$ NE-SE * WEA$_o$ R + L + S + ZR

270. (12) VIS$_o$ $\leq$ 2 1/2 * WDR$_o$ SSE-SW * WEA$_o$ R + L + S + ZR

271. (5) VIS$_o$ $\geq$ 3 * WDR$_o$ SSE-SW * WEA$_o$ R + RW + S + SW

272. (18) VIS$_o$ $\geq$ 5 * WDR$_o$ S-W * WEA$_o$ None

273. (3) VIS$_o$ $\leq$ 4 * WDR$_o$ SW-WNW * WEA$_o$ R + RW + L + ZR

274. (0) VIS$_o$ $\leq$ 4 * WDR$_o$ SW-WNW * WEA$_o$ * WEA$_o$ S + SW

275. (6) VIS$_o$ $\geq$ 5 * WDR$_o$ W-N * WEA$_o$ None

276. (24) CIG$_o$ $\leq$ 400 * WSD$_o$ $\leq$ 5 * WEA$_o$ L + F + GF

277. (3) CIG$_o$ $\leq$ 100 * WSD$_o$ $\leq$ 5 * WEA$_o$ L + F + GF

278. (2) VIS$_o$ $\leq$ 3/8 * WSD$_o$ $\leq$ 5 * WEA$_o$ L + F + GF

279. (14) VIS$_0 \le$ 7/8 * WSD$_0 \le$ 5 * WEA$_0$ L + F + GF

280. (23) TOD 2200-0500 * RLH$_0 \ge$ 80 * ((WEA$_{-2}$ R + RW) + (WEA$_{-1}$ R + RW))

281. (2) CIG$_0 \le$ 4900 * WSD$_0 \le$ 9 * RLH$_0 \ge$ 90 * RLH$_{-3} \le$ 79 * TCA$_0$ > 9

282. (0) CIG$_0$ 1000-4900 * RLH$_0 \le$ 69 * WEA$_0$ R + L

284. (112) TOD 1600-0100 * CIG$_0 \le$ 400 * (RLH$_0 \ge$ 90 + WEA$_0$ L)

285. (23) TOD 1800-0300 * WSD$_0 \le$ 5 RLH$_0 \ge$ 90 * TCA$_0$ < 1

286. (1) WDR$_{-3}$ S-SW * WDR$_0$ WSW-NW * WEA$_0$ R + L

287. (0) WDR$_0$ ESE-SSW * WSD$_0 \le$ 5 * WEA$_{-2}$ None * WEA$_0$ R + L

288. (105) TOD 2200-0300 * RLH$_0 \le$ 90 * WEA$_0$ F + GF + H + K

289. (27) WEA$_{-2}$ R + RW + L * WEA$_0$ F + GF

290. (1) VIS$_0 \le$ 4 * WDR$_0$ NE-S * WSD$_0$ 4-9 * ((DPT$_{-3} \le$ 29
 * DPT$_0$ 30-39) + (DPT$_{-3}$ 30-39 * DPT$_0$ 40-49) + (DPT$_{-3}$ 40-59
 * DPT$_0$ 60-69) + (DPT$_{-3}$ 60-69 * DPT$_0 \ge$ 70))

291. (7) VIS$_0 \le$ 4 * WDR$_0$ NE-S * WSD$_0$ 4-9
 * ((DBT$_{-3} \le$ 29 * DBT$_0$ 35-44) + (DBT$_{-3}$ 21-34 + DBT$_0$ 35-54)
 + (DBT$_{-3}$ 35-44 * DBT$_0$ 45-64) + (DBT$_{-3}$ 45-54 * DBT$_0$ 55-74)
 + (DBT$_{-3}$ 55-64 * DBT$_0$ 65-84)) * WEA$_0$ R + L

292. (0) ((WDR$_{-3}$ NNW-NNE * WDR$_0$ ENE-ESE) + (WDR$_{-3}$ NNE-ENE * WDR$_0$ ESE-SSE)
 + (WDR$_{-3}$ ENE-E * WDR$_0$ SE-S)) * WSD$_0$ 4-9 * ((DPT$_{-3} \le$ 29
 * DPT$_0$ 30-39) + (DPT$_{-3}$ 30-39 * DPT$_0$ 40-59) + (DPT$_{-3}$ 40-59
 * DPT$_0$ 60-69) + (DPT$_{-3}$ 60-69 * DPT$_0 \ge$ 70))
 * ((SLP$_{-3} \ge$ 1019.95 * SLP$_0$ 1009.95-1019.95)
 + (SLP$_{-3}$ 1009.95-1019.95 * SLP$_0$ 999.95-1009.95)
 + (SLP$_{-3}$ 999.95-1009.95 * SLP$_0 \le$ 999.95))

293. (2) ((WDR$_{-3}$ SSW-SW * WDR$_0$ SE-SSE
 + (WDR$_{-3}$ S-SSW * WDR$_0$ ESE-SE)
 + (WDR$_{-3}$ SSE-S * WDR$_0$ E-ESE)
 + (WDR$_{-3}$ SE-SSE * WDR$_0$ ENE-E)
 + (WDR$_{-3}$ ESE-SE * WDR$_0$ NE-ENE))
 * WSD$_0$ 4-19 * RLH$_0 \ge$ 70
 * ((SLP$_{-3} \ge$ 1024.95 * SLP$_0 \le$ 1024.95)
 + (SLP$_{-3} \ge$ 1019.95 * SLP$_0$ 1009.95-1019.95)
 + (SLP$_{-3}$ 999.95-1009.95 * SLP$_0 \le$ 999.95))

295. (0) CIG_{-1} 500-900 * $CIG_o \le 400$

296. (0) CIG_{-1} 1000-1900 * $CIG_o \le 900$

297. (2) $CIG_{-1} \ge 2000$ * CIG_o 1000-1900

298. (1) CIG_{-3} 500-1900 * $CIG_o \le 400$

299. (0) CIG_{-3} 1000-1900 * $CIG_o \le 900$

300. (39) $CIG_{-3} \ge 2000$ * $CIG_o \le 1900$

301. (1) VIS_{-1} 1-4 * $VIS_o \le 7/8$

302. (3) VIS_{-1} 1-4 * $VIS_o \le 1\ 3/8$

303. (7) $VIS_{-3} \ge 3$ * $VIS_o \le 1\ 3/8$

304. (1) $VIS_{-3} \ge 1\ 1/2$ * $VIS_o \le 7/8$

305. (12) $VIS_{-3} \ge 5$ * $VIS_o \le 2\ 1/2$

306. (0) $VIS_{-3} \ge 5$ * VIS_o 4 * WSD_{-3} 6-19
* $WSD_o \le 5$ * $RLH_{-3} \le 79$ * $RLH_o \ge 80$

307. (2) $VIS_{-3} \ge 3$ * $VIS_o \le 2\ 1/2$ * WSD_{-3} 4-9 * $WSD_o \le 5$
* $RLH_{-3} \le 79$ * $RLH_o \ge 80$

308. (0) WDR_o SSE-WSW * $WSD_{-3} \le 9$ * $WSD_o \ge 10$
* (($SLP_{-3} \ge 1009.95$ * $SLP_o \le 1009.95$
+ ($SLP_{-3} \ge 999.95$ * $SLP_o \le 999.95$))

309. (34) $WSD_o \le 9$ * $RLH_o \ge 70$ * WEA_o R + RW + L + ZR

310. (11) $WSD_o \le 19$ * $RLH_o \ge 80$ * WEA_o S + SW

311. (17) $CIG_o \le 900$ * $VIS_o \le 2\ 1/2$

312. (17) $CIG_o \le 900$ * WDR_o SE-SSW * $RLH_o \ge 80$

313. (9) $CIG_o \le 900$ * WDR_o SSW-WSW * $RLH_o \ge 80$

314. (8) $CIG_o \le 1900$ * WDR_o WNW-N * $RLH_o \ge 80$

315. (71) WDR_o NE-SE * SCL_o 4-7

316. (12) WDR_o SE-SW * SCL_o 4-7

317. (24) WDR_o NW-NNE * SCL_o 4-7

318. (4) $CIG_o \le 1900$ * WDR_o W-N * WEA_o S + SW

319. (3) $CIG_o \le 1900$ * WDR_o W-N * WEA_o R + RW + L + ZR

320. (9) $VIS_o \le 4$ * WDR_o W-N * WEA_o S + SW

321. (0) $VIS_o \le 4$ * WDR_o W-N * WEA_o R + RW + L + ZR

322. (3) $CIG_{-3} \le 400$ * $CIG_o \ge 500$

323. (1) $CIG_{-3} \le 400$ * $CIG_o \ge 1000$

324. (2) $VIS_{-3} \le 7/8$ * $VIS_o \ge 1\ 1/2$

325. (8) $VIS_{-3} \leq 1\ 3/8$ * $VIS_{o} \geq 1\ 1/2$

326. (2) $VIS_{-3} \leq 1\ 3/8$ * $VIS_{o} \geq 3$

327. (0) WDR_{-3} SSW-W * WDR_{o} ESE-S
* (($DPT_{-3} \leq 29$ * $DPT_{o} \geq 30$) + (DPT_{-3} 30-39
* $DPT_{o} \geq 40$) + (DPT_{-3} 40-59 * $DPT_{o} \geq 60$)
+ (DPT_{-3} 60-69 * $DPT_{o} \geq 70$)) * $TCA_{o} \geq 6$)

328. (0) WDR_{-3} NW-NNE * WDR_{o} NE-ESE
* (($DPT_{-3} \leq 29$ * $DPT_{o} \geq 30$) + (DPT_{-3} 30-39
* $DPT_{o} \geq 40$) + (DPT_{-3} 40-59 * $DPT_{o} \geq 60$)
+ (DPT_{-3} 60-69 * $DPT_{o} \geq 70$)) * $TCA_{o} \geq 6$

329. (0) WDR_{-3} NW-N * WDR_{o} NNE-E
* WEA_{-2} None * WEA_{o} R + L + ZR + S

330. (3) WDR_{-3} SSE-SW * WDR_{o} NE-ESE
* WEA_{-2} None * WEA_{o} R + L + ZR + S

331. (3) (($CIG_{-3} \leq 400$ * $CIG_{o} \geq 500$) + ($VIS_{-3} \leq 7/8$
* $VIS_{o} \geq 1\ 1/2$)) * (($RLH_{-3} \geq 90$ * $RLH_{o} \leq 89$)
+ ($WSD_{-3} \leq 5$ * $WSD_{o} \geq 6$))

332. (13) $CIG_{o} \leq 1900$

333. (6) $VIS_{o} \leq 4$

334. (23) (DOY 261-80 * ((TOD 02-05 * (($VIS_{-3} \geq 5$
* $VIS_{-1} \leq 4$ * $VIS_{o} \leq 1\ 3/8$) + (VIS_{-3} 1 1/2-6
* VIS_{-1} 1-4 * $VIS_{o} \leq 2\ 1/2$) + $VIS_{o} \leq 3/8$))
+ (TOD 22-01 * (($VIS_{-3} \geq 5$ * $VIS_{-1} \leq 2\ 1/2$
* $VIS_{o} \leq 1\ 3/8$) + (VIS_{-3} 1-4 * $VIS_{o} \leq 1\ 3/8$)
+ $VIS_{o} \leq 3/8$))))
+ (DOY 81-260 * ((TOD 02-05 * (($VIS_{-1} \leq 2\ 1/2$
* $VIS_{o} \leq 1\ 3/8$) + $VIS_{o} \leq 3/8$))
+ (TOD 22-01 * (($VIS_{-1} \leq 1\ 3/8$ * $VIS_{o} \leq 1\ 3/8$)
+ $VIS_{o} \leq 3/8$)))) + (TOD 18-21 * $VIS_{o} \leq 3/8$)

335. (3) (DOY 261-80 * ((TOD 04-09 * (($VIS_{-3} \geq 5$
* $VIS_{-1} \leq 4$ * $VIS_{o} \leq 1\ 3/8$) + (VIS_{-3} 1 1/2-6 * VIS_{-1} 1-4
* $VIS_{o} \leq 2\ 1/2$) + $VIS_{o} \leq 3/8$)) + (TOD 00-05
* (($VIS_{-3} \geq 5$ * $VIS_{-1} \leq 2\ 1/2$ * $VIS_{o} \leq 1\ 3/8$)
+ (VIS_{-3} 1-4 * $VIS_{o} \leq 1\ 3/8$) + $VIS_{o} \leq 3/8$))))

+ (DOY 81-260 * ((TOD 04-09 * (($VIS_{-1} \leq 2\ 1/2$
* $VIS_{o} \leq 1\ 3/8$) + $VIS_{o} \leq 3/8$)) + (TOD 00-05
* (($VIS_{-1} \leq 1\ 3/8$ * $VIS_{o} \leq 1\ 3/8$) + $VIS_{o} \leq 3/8$))))
+ (TOD 20-01 * $VIS_{o} \leq 3/8$)

336. (3) (DOY 261-80 * ((TOD 02-05 * (($CIG_{-3} \geq 2000$
* $CIG_{-1} \leq 1900$ * $CIG_{o} \leq 400$) + (CIG_{-3} 1000-4900
* CIG_{-1} 500-1900 * $CIG_{o} \leq 900$) + $CIG_{o} \leq 100$))
+ (TOD 22-01 * (($CIG_{-3} \geq 2000$ * $CIG_{-1} \leq 900$
* $CIG_{o} \leq 400$) + (CIG_{-3} 500-1900 * $CIG_{o} \leq 400$)
+ $CIG_{o} \leq 100$))))
+ (DOY 81-260 * ((TOD 02-05 * (($CIG_{-1} \leq 900$
* $CIG_{o} \leq 400$) + $CIG_{o} \leq 100$)) + (TOD 22-01
* (($CIG_{-1} \leq 400$ * $CIG_{o} \leq 400$) + $CIG_{o} \leq 100$))))
+ (TOD 18-21 * $CIG_{o} \leq 100$)

337. (28) (DOY 261-80 * ((TOD 04-09 * (($CIG_{-3} \geq 2000$
* $CIG_{-1} \leq 1900$ * $CIG_{o} \leq 400$) + (CIG_{-3} 1000-4900
* CIG_{-1} 500-2900 * $CIG_{o} \leq 900$) + $CIG_{o} \leq 100$))
+ (TOD 00-05 * (($CIG_{-3} \geq 2000$ * $CIG_{-1} \leq 900$
* $CIG_{o} \leq 400$) + (CIG_{-3} 500-1900 * $CIG_{o} \leq 400$)
+ $CIG_{o} \leq 100$))))
+ (DOY 81-260 * ((TOD 04-09 * (($CIG_{-1} \leq 900$
* $CIG_{o} \leq 400$) + $CIG_{o} \leq 100$)) + (TOD 00-05
* (($CIG_{-1} \leq 400$ * $CIG_{o} \leq 400$) + $CIG_{o} \leq 100$))))
+ (TOD 20-01 * $CIG_{o} \leq 100$)

338. (14) ((DOY 261-80 * ((TOD 02-05 * (($VIS_{-3} \geq 5$
* $VIS_{-1} \leq 4$ * $VIS_{o} \leq 1\ 3/8$) + (VIS_{-3} 1 1/2-6
* VIS_{-1} 1-4 * $VIS_{o} \leq 2\ 1/2$) + $VIS_{o} \leq 3/8$))
+ (TOD 22-01 * (($VIS_{-3} \geq 5$ * $VIS_{-1} \leq 2\ 1/2$
* $VIS_{o} \leq 1\ 3/8$) + VIS_{-3} 1-4 * $VIS_{o} \leq 1\ 3/8$
+ $VIS_{o} \leq 3/8$)))) + (DOY 81-260
* ((TOD 02-05 * (($VIS_{-1} \leq 2\ 1/2$ * $VIS_{o} \leq 1\ 3/8$)
+ $VIS_{o} \leq 3/8$)) + (TOD 22-01 * (($VIS_{-1} \leq 1\ 3/8$
* $VIS_{o} \leq 1\ 3/8$) + $VIS_{o} \leq 3/8$)))) + (TOD 18-21
* $VIS_{o} \leq 3/8$)) * ((DOY 261-80

* ((TOD 02-05 * ((CIG$_{-3} \geq$ 3000 * CIG$_{-1} \leq$ 1900
* CIG$_0 \leq$ 400) + (CIG$_{-3}$ 1000-4900 * CIG$_{-1}$ 500-2900
* CIG$_0$ 900) + CIG$_0 \leq$ 100)) + (TOD 22-01
* ((CIG$_{-3} \geq$ 3000 * CIG$_{-1} \leq$ 900 * CIG$_0 \leq$ 400)
+ (CIG$_{-3}$ 500-2900 * CIG$_0 \leq$ 400) + CIG$_0 \leq$ 100))))
+ (DOY 81-260 * ((TOD 02-05 * ((CIG$_{-1} \leq$ 900
* CIG$_0 \leq$ 400) + CIG$_0 \leq$ 100)) + (TOD 22-01
* ((CIG$_{-1} \leq$ 400 * CIG$_0 \leq$ 400) + CIG$_0 \leq$ 100))))
+ (TOD 18-21 * CIG$_0 \leq$ 100))

339. (7) ((DOY 261-80 * ((TOD 04-09 * ((VIS$_{-3} \geq$ 5
* VIS$_{-1} \leq$ 4 * VIS$_0 \leq$ 1 3/8) + (VIS$_{-3}$ 1 1/2-6 * VIS$_{-1}$ 1-4
* VIS$_0 \leq$ 2 1/2) + VIS$_0 \leq$ 3/8)) + (TOD 00-05
* ((VIS$_{-3} \geq$ 5 * VIS$_{-1} \leq$ 2 1/2 * VIS$_0 \leq$ 1 3/8)
+ (VIS$_{-3}$ 1-4 * VIS$_0 \leq$ 1 3/8) + VIS$_0 \leq$ 3/8))))
+ (DOY 81-260 * ((TOD 04-09 * ((VIS$_{-1} \leq$ 2 1/2
* VIS$_0 \leq$ 1 3/8) + VIS$_0 \leq$ 3/8)) + (TOD 00-05
* ((VIS$_{-1} \leq$ 1 3/8 * VIS$_0 \leq$ 1 3/8) + VIS$_0 \leq$ 3/8))))
+ (TOD 20-01 * VIS$_0 \leq$ 3/8))
* ((DOY 261-80 * ((TOD 04-09 * ((CIG$_{-3} \geq$ 3000
* CIG$_{-1} \leq$ 1900 * CIG$_0 \leq$ 400) + (CIG$_{-3}$ 1000-4900
* CIG$_{-1}$ 500-2900 * CIG$_0 \leq$ 900) + CIG$_0 \leq$ 100))
+ (TOD 00-05 * ((CIG$_{-3} \geq$ 3000 * CIG$_{-1} \leq$ 900
* CIG$_0 \leq$ 400) + (CIG$_{-3}$ 500-2900 * CIG$_0 \leq$ 400)
+ CIG$_0 \leq$ 100)))) + (DOY 81-260 * ((TOD 04-09
* ((CIG$_{-1} \leq$ 900 * CIG$_0 \leq$ 400) + CIG$_0 \leq$ 100))
+ (TOD 00-05 * ((CIG$_{-1} \leq$ 400 * CIG$_0 \leq$ 400)
+ CIG$_0 \leq$ 100)))) + (TOD 20-01 * CIG$_0 \leq$ 100))

APPENDIX B

PERIODS OF RECORD OF DEPENDENT DATA

This appendix lists the period of record of the data base used to derive prediction equations for each terminal. All dates shown are inclusive.

STATIONS IN CONTERMINOUS U. S.

Terminal	Period of Record
1. Albany, N. Y.	January 1955 - December 1964
2. Atlanta, Ga.	January 1955 - December 1964
3. Baltimore, Md.	January 1955 - December 1964
4. Buffalo, N. Y.	January 1955 - December 1964
5. Nashville, Tenn.	January 1955 - December 1964
6. Boston, Mass.	January 1955 - December 1964
7. Birmingham, Ala.	January 1955 - December 1964
8. Cleveland, Ohio	January 1955 - December 1964
9. Cincinnati, Ohio	January 1955 - December 1964
10. Washington, D. C.	January 1955 - December 1964
11. New York (Kennedy), N. Y.	January 1955 - December 1964
12. New Orleans, La.	January 1955 - December 1964
13. Chicago (Midway), Ill.	January 1955 - December 1964
14. Pittsburgh, Pa.	January 1955 - December 1964
15. Raleigh-Durham, N. C.	January 1955 - December 1964
16. Savannah, Ga.	January 1955 - December 1964
17. St. Louis, Mo.	January 1955 - December 1964
18. Louisville, Ky.	January 1955 - December 1964
19. Tallahassee, Fla.	January 1955 - December 1964
20. Knoxville, Tenn.	January 1955 - December 1964
21. Bedford, Mass.	January 1955 - December 1964
22. Jackson (Hawkins Field), Miss.	July 1953 - June 1963
23. Greenville, S. C.	November 1952 - October 1962
24. Middleton, Pa.	January 1955 - December 1964
25. Moses Lake, Wash.	January 1955 - December 1964
26. Spartanburg, S. C.	January 1948 - December 1951 January 1960 - December 1961
27. Idaho Falls, Id.	January 1948 - December 1954

Appendix B (Cont'd.)

STATIONS IN ALASKA

Terminal	Period of Record
1. Anchorage	January 1955 - December 1964
2. Fairbanks	January 1955 - December 1964
3. Juneau	January 1955 - December 1964
4. King Salmon	January 1956 - December 1964
5. Annette	January 1955 - December 1964
6. Cold Bay	July 1955 - December 1964
7. Sitka	January 1954 - December 1963
8. Yakutat	January 1954 - July 1960
9. Cordova	January 1956 - December 1964
10. Bethel	January 1955 - December 1964
11. Nome	January 1955 - December 1964
12. Kotzebue	January 1955 - December 1964
13. McGrath	January 1955 - December 1964
14. Barrow	January 1955 - December 1964
15. Unalakleet	January 1952 - December 1961
16. Northway	January 1952 - December 1954 January 1958 - December 1964
17. Bettles	January 1955 - December 1964
18. Kenai	January 1955 - December 1964
19. Shemya	September 1959 - December 1964
20. Kodiak	January 1955 - December 1964
21. Barter Island	January 1957 - December 1964
22. Adak	January 1955 - December 1964
23. Summit	January 1951 - December 1960

APPENDIX C

ORDER OF SELECTION OF PREDICTORS BY TERMINAL

This appendix lists the predictors in their order of selection in each of the 10 equations for the 20 terminals identified in Table 1(a). The projection times are in hours, and the predictors are identified by number as given in Appendix A.

SAVANNAH,GEORGIA

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	5	73	73	17	17	36	36	8
2	338	82	82	232	232	334	232	232	232	36
3	196	284	73	82	82	288	284	75	73	232
4	82	73	232	315	315	269	36	73	81	72
5	284	232	284	103	33	61	205	269	263	148
6	61	288	29	8	8	92	81	153	108	109
7	232	29	197	66	66	146	288	131	72	189
8	73	254	115	33	103	285	92	284	109	122
9	288	61	36	284	109	232	285	59	149	81
10	190	172	172	197	254	110	86	115	192	64
11	110	258	8	141	98	222	139	189	269	324
12	172	8	269	254	44	36	113	155	61	103
13	8	190	33	108	36	161	269	81	86	315
14	258	6	141	98	289	205	153	86	288	97
15	289	115	280	109	257	243	85	114	6	192
16	88	95	66	262	217	81	289	109	64	108
17	107	289	300	289	291	244	263	192	190	58
18	300	311	155	36	149	115	239	113	141	215
19	144	192	110	29	252	86	192	118	118	91
20	29	141	77	114	141	139	242	139	137	254
21	138	114	109	257	99	180	115	137	145	220
22	211	33	99	335	235	103	123	122	189	61
23	161	197	103	134	137	26	148	64	33	42
24	212	129	315	118	334	148	142	190	89	31
25	334	155	192	192	286	93	64	165	112	73
26	269	113	311	288	289	165	106	88	337	104
27	90	106	190	156	284	190	114	145	254	131
28	234	234	165	145	196	122	155	205	186	288
29	267	156	108	123	114	194	190	85	140	105
30	238	288	262	148	148	142	6	148	114	53

MSY NEW ORLEANS,LA.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	8	8	8	334	17	7	232	13
2	338	284	232	73	73	13	284	284	105	109
3	196	73	73	232	232	288	232	56	73	73
4	198	82	284	109	109	232	288	205	17	325
5	284	8	82	39	39	92	205	170	56	32
6	8	231	109	82	159	61	56	115	194	232
7	82	258	39	36	325	284	234	232	189	236
8	288	288	205	108	36	56	92	113	115	56
9	233	112	112	322	82	251	115	275	121	194
10	73	39	56	112	97	234	59	105	145	220
11	251	205	110	57	194	82	113	127	122	334
12	61	56	115	56	56	93	82	121	36	108
13	231	115	150	103	103	110	189	194	113	97
14	190	105	170	121	108	146	95	86	325	148
15	300	338	103	194	65	205	194	150	114	65
16	112	64	64	170	338	150	242	114	39	46
17	88	155	33	197	5	220	38	95	103	103
18	334	170	194	33	300	86	86	157	32	323
19	150	66	5	284	317	102	150	73	157	276
20	144	83	66	38	91	62	93	317	112	170
21	110	95	38	40	38	193	106	112	127	95
22	90	300	300	222	322	196	73	242	57	123
23	64	151	244	141	117	285	285	213	170	268
24	169	106	114	142	89	209	233	122	155	86
25	311	242	40	137	33	106	122	318	141	288
26	66	194	315	145	57	91	209	222	268	105
27	56	33	106	233	40	223	317	38	241	107
28	58	89	131	66	110	115	91	210	104	104
29	39	138	233	315	268	114	334	94	55	113
30	269	190	151	115	233	144	108	233	191	50

RALEIGH-DURHAM,N.C.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	73	73	73	13	76	73	73	8
2	196	82	82	82	315	288	269	269	269	315
3	82	73	232	315	82	82	284	75	142	142
4	61	284	8	8	8	219	197	111	315	82
5	2	61	36	66	66	61	73	36	75	74
6	284	315	284	36	64	268	134	289	103	64
7	231	288	197	232	74	92	36	252	36	269
8	73	232	141	103	269	284	288	141	83	86
9	288	141	33	74	36	315	82	191	288	66
10	190	197	111	141	33	134	159	29	157	98
11	8	8	190	64	143	215	231	103	64	149
12	172	66	191	190	49	269	141	140	230	109
13	269	33	289	284	280	146	190	137	190	103
14	233	172	315	280	39	333	61	121	65	91
15	138	190	66	33	289	103	103	197	141	189
16	60	6	140	124	190	285	315	123	140	232
17	332	140	123	87	232	73	64	85	121	61
18	29	123	39	289	121	113	140	64	252	73
19	39	36	49	39	137	221	112	284	137	105
20	36	269	246	121	288	62	191	190	191	209
21	88	35	313	57	159	135	90	241	29	36
22	110	332	280	137	104	140	123	315	123	289
23	334	309	309	140	141	172	86	157	145	208
24	197	159	64	191	189	229	289	309	48	117
25	66	103	103	123	140	158	125	135	302	233
26	103	255	112	172	98	141	92	271	335	108
27	89	139	269	102	300	76	172	335	219	312
28	218	29	74	49	293	289	143	145	124	181
29	90	115	90	288	101	36	308	148	112	258
30	289	137	55	167	167	232	148	99	207	337

DCA WASHINGTON(NATIONAL),D.C.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	[illegible]	8	73	73	13	17	215	215	73
2	88	62	82	315	315	92	5	315	36	17
3	82	315	315	82	36	5	92	13	73	36
4	195	92	36	36	82	159	205	176	153	64
5	253	170	73	8	64	16	315	139	13	105
6	8	73	232	64	232	197	139	73	64	148
7	144	197	197	232	189	13	284	36	139	176
8	58	269	317	189	34	315	269	122	176	139
9	170	234	141	141	137	338	288	269	315	134
10	284	138	126	98	16	288	91	64	49	232
11	7	36	64	170	8	14	189	153	118	118
12	269	175	33	66	66	140	145	284	137	96
13	158	8	227	137	139	284	[illegible]	91	122	32
14	73	7	170	59	96	88	73	94	222	147
15	59	288	284	34	233	145	36	140	247	46
16	172	33	269	55	105	101	147	59	147	16
17	314	232	312	191	57	232	175	232	309	115
18	129	141	257	33	147	91	172	88	115	142
19	33	77	140	316	63	147	49	261	96	63
20	288	156	55	126	55	264	94	49	284	326
21	138	115	191	7	169	219	64	175	94	82
22	190	126	262	115	118	285	82	118	130	90
23	81	262	196	105	136	187	16	126	252	61
24	32	309	88	91	74	228	115	115	95	72
25	209	317	112	222	317	76	134	[illegible]	55	42
26	92	55	130	224	170	82	113	15	138	319
27	309	191	309	130	326	175	88	82	12	122
28	261	64	233	140	310	78	247	172	108	127
29	39	98	246	57	108	269	153	203	87	84
30	115	34	90	249	172	176	157	137	172	108

ATL ATLANTA,GA.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	~~5~~	~~5~~	~~73~~	~~73~~	~~73~~	~~85~~	~~75~~	~~82~~	~~73~~	73
2	206	82	82	170	170	206	269	73	269	269
3	61	284	170	82	275	232	181	234	36	36
4	258	73	241	275	269	82	284	241	180	181
5	~~82~~	~~241~~	~~275~~	~~241~~	~~103~~	~~92~~	~~73~~	~~33~~	~~232~~	103
6	334	61	284	103	33	61	61	284	214	.15
7	73	170	232	33	74	113	170	190	103	109
8	[illegible]	232	102	141	265	241	190	205	110	75
9	~~284~~	~~141~~	~~141~~	~~74~~	~~109~~	~~288~~	~~159~~	~~141~~	~~189~~	64
10	232	197	197	232	143	13	232	64	190	65
11	180	275	103	102	82	170	288	232	258	33
12	193	190	123	317	137	181	110	189	64	288
13	~~60~~	~~288~~	~~190~~	~~123~~	~~317~~	~~16~~	~~92~~	~~102~~	~~141~~	39
14	197	158	64	190	98	190	81	103	137	190
15	90	103	36	258	64	197	205	181	252	196
16	280	123	148	137	39	196	141	214	121	230
17	~~242~~	~~110~~	~~74~~	~~64~~	~~36~~	~~226~~	~~175~~	~~123~~	~~147~~	105
18	92	64	317	192	280	75	107	269	123	175
19	113	149	112	121	232	187	64	36	170	229
20	138	33	140	148	141	93	36	17	148	141
21	~~103~~	~~231~~	~~93~~	~~147~~	~~337~~	~~141~~	~~140~~	~~140~~	99	137
22	36	88	33	142	195	140	241	175	111	108
23	8	247	61	36	252	107	103	148	33	46
24	55	99	234	337	121	301	95	112	95	96
25	~~191~~	~~142~~	~~87~~	~~197~~	~~147~~	~~315~~	~~144~~	~~337~~	~~106~~	102
26	288	102	319	140	214	62	112	150	98	337
27	175	248	142	99	105	144	155	137	108	8
28	114	72	39	111	193	111	193	121	155	81
29	~~231~~	~~226~~	~~180~~	~~39~~	~~46~~	~~175~~	~~160~~	~~97~~	~~175~~	142
30	195	140	66	284	123	102	139	158	205	63

BHM BIRMINGHAM,ALA.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	73	73	73	85	85	215	73	73
2	196	82	82	82	82	278	197	73	75	232
3	82	73	234	234	170	215	288	61	232	75
4	338	284	8	39	39	61	73	269	153	109
5	190	170	39	232	232	311	7	113	113	51
6	73	61	232	170	109	92	75	141	127	141
7	61	232	197	109	74	146	93	58	142	65
8	288	272	141	57	121	288	92	284	82	82
9	170	58	284	141	50	135	113	123	102	121
10	92	141	123	121	33	160	285	106	106	220
11	284	113	289	192	57	13	269	91	50	331
12	146	123	112	137	137	58	89	232	242	108
13	58	138	192	123	141	266	135	82	234	134
14	272	88	50	102	192	132	141	53	49	234
15	90	289	170	289	145	113	106	140	121	268
16	206	36	113	74	317	196	95	86	57	53
17	289	312	121	33	108	268	175	153	115	248
18	26	50	272	50	234	55	227	234	141	46
19	259	8	36	145	272	191	61	310	65	55
20	50	66	148	272	36	175	265	89	122	142
21	132	95	142	197	49	216	140	148	137	149
22	88	192	66	35	220	83	87	121	46	102
23	112	142	312	112	38	185	284	115	145	254
24	175	288	106	103	269	82	234	86	99	284
25	190	103	175	142	120	86	223	175	148	86
26	8	151	140	66	118	73	134	143	325	185
27	67	112	134	140	8	26	156	137	95	106
28	250	175	145	148	300	208	219	56	156	54
29	285	149	99	120	123	193	180	190	248	57
30	113	26	115	175	104	221	122	97	284	112

KNOXVILLE, TENNESSEE

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	82	73	73	17	17	75	73	73
2	82	82	73	82	82	61	58	269	269	17
3	279	73	5	5	5	334	82	73	153	142
4	311	288	288	289	232	222	288	139	17	269
5	8	146	269	64	105	17	139	205	142	105
6	288	311	64	300	222	288	222	153	139	149
7	146	8	205	115	115	146	269	222	44	315
8	61	58	103	269	64	221	146	91	118	64
9	88	232	141	8	74	205	285	44	134	82
10	232	64	8	141	218	279	91	115	122	139
11	300	300	115	123	112	197	115	172	252	134
12	73	49	302	118	139	82	92	82	309	118
13	83	59	95	58	118	92	245	167	145	44
14	310	112	233	137	137	230	258	252	99	147
15	132	90	300	88	252	139	134	118	315	167
16	89	284	266	103	103	273	145	148	300	103
17	92	265	113	148	122	115	73	48	148	48
18	67	280	155	266	289	159	220	246	48	8
19	110	115	89	112	190	101	94	134	64	104
20	49	302	112	108	175	135	273	94	115	300
21	64	175	90	89	145	26	156	300	222	27
22	85	190	175	90	48	27	221	92	85	122
23	266	138	123	156	266	226	85	64	266	85
24	7	91	156	293	112	305	122	99	103	222
25	309	107	280	74	112	49	175	86	135	115
26	297	93	222	170	104	16	148	103	41	266
27	59	222	312	155	98	148	138	288	81	72
28	90	208	190	222	309	185	113	35	91	127
29	222	135	153	187	63	122	27	155	233	194
30	93	310	66	76	167	106	129	143	102	192

BNA NASHVILLE, TENN.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	5	73	73	13	17	75	75	73
2	196	82	73	7	82	288	82	7	73	17
3	82	73	82	82	7	278	288	73	233	109
4	219	233	233	8	109	75	197	269	142	233
5	3	62	288	233	39	311	233	115	83	142
6	8	284	103	115	215	61	73	139	115	108
7	61	288	115	64	108	221	111	122	109	149
8	284	7	64	109	36	334	108	87	157	82
9	269	8	62	189	233	142	139	309	315	315
10	160	269	8	141	64	87	311	118	87	72
11	73	205	138	215	284	140	115	284	222	311
12	2 8	64	269	175	74	146	285	315	190	190
13	92	115	155	284	55	92	269	190	118	99
14	10	90	123	103	191	135	92	153	139	46
15	[illegible]	300	39	39	175	[illegible]	122	205	46	28
16	132	309	300	122	112	309	190	137	134	115
17	233	55	284	65	121	73	284	48	108	118
18	300	191	175	190	141	193	62	148	196	86
19	146	111	139	276	122	226	86	175	57	7
20	67	276	58	121	53	115	276	103	145	36
21	89	155	190	36	134	232	94	145	48	208
22	214	138	7	58	145	60	148	99	122	211
23	90	39	276	134	57	280	121	138	28	235
24	312	298	337	140	98	150	99	86	268	55
25	158	262	280	53	265	134	247	233	138	191
26	254	123	72	145	281	91	225	155	117	318
27	112	66	55	337	291	284	155	208	65	8
28	62	102	191	55	199	269	46	57	337	337
29	64	318	121	191	317	247	143	276	276	276
30	59	112	281	148	235	10	280	108	96	288

STL ST. LOUIS, MISSOURI

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	5	5	73	13	13	17	17	17
2	196	73	73	73	7	279	234	170	73	73
3	7	258	234	170	170	215	113	73	36	36
4	73	82	82	82	82	220	197	242	311	105
5	88	284	258	175	49	203	276	311	103	265
6	82	234	17	49	86	288	75	91	139	5
7	146	58	175	258	64	113	242	189	46	175
8	284	232	110	86	109	170	139	113	170	91
9	269	154	170	300	189	92	311	103	122	139
10	58	138	138	103	5	267	36	139	134	137
11	110	175	103	64	175	58	91	197	121	121
12	288	8	49	254	300	242	154	36	113	46
13	8	113	58	138	65	154	288	266	242	103
14	234	288	300	65	55	146	73	276	145	270
15	279	86	242	33	191	35	189	49	252	315
16	258	107	64	98	121	269	103	86	32	177
17	175	209	156	197	232	26	86	222	148	115
18	138	276	86	139	103	89	267	339	55	266
19	213	170	231	121	57	265	269	175	265	164
20	300	95	95	123	139	140	265	5	266	86
21	59	64	227	137	137	175	248	106	175	222
22	190	300	65	189	112	7	49	138	205	251
23	90	219	139	112	36	49	26	190	181	138
24	55	222	154	234	197	86	140	218	115	123
25	152	151	190	143	145	114	111	154	254	147
26	208	49	123	145	63	73	209	234	176	205
27	112	17	254	63	84	276	270	169	86	170
28	232	103	284	148	242	285	35	248	191	304
29	66	242	181	190	222	201	170	121	7	32
30	114	190	112	284	279	91	190	137	112	84

BUF BUFFALO,N.Y.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	73	73	73	13	13	75	75	75
2	196	73	5	82	48	9	215	73	73	73
3	73	6	64	48	82	215	159	13	48	53
4	1	64	48	64	49	16	73	95	13	45
5	3	269	82	49	64	338	48	48	45	13
6	214	48	284	189	315	78	269	87	95	87
7	284	85	49	63	189	288	288	55	87	315
8	85	124	269	232	63	73	124	269	63	63
9	64	82	63	170	227	10	84	159	84	105
10	48	49	189	227	170	269	45	139	315	95
11	165	232	227	102	74	284	95	63	55	112
12	269	63	95	112	317	17	55	45	139	113
13	83	284	315	315	232	128	63	84	134	51
14	8	280	130	95	105	227	87	125	102	88
15	124	214	84	65	88	88	139	94	118	84
16	116	46	264	84	112	116	102	102	309	48
17	88	95	214	103	134	101	78	130	93	134
18	280	138	232	105	147	99	309	222	92	139
19	2	8	125	110	118	64	92	99	49	44
20	49	33	208	317	139	226	99	315	44	191
21	61	196	138	139	110	309	75	223	147	115
22	100	94	46	17	337	87	64	309	149	74
23	256	61	291	88	84	55	337	64	122	220
24	230	337	288	90	36	95	284	316	138	317
25	63	158	179	288	216	41	90	288	86	78
26	288	92	105	89	103	113	16	109	16	123
27	87	84	170	337	149	201	101	252	305	64
28	67	227	92	159	123	84	106	284	39	58
29	175	180	115	138	39	109	226	93	94	36
30	102	175	94	74	138	61	93	218	115	272

ALB ALBANY,N.Y.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	5	73	73	13	17	17	17	17
2	6	73	73	82	176	215	73	176	176	176
3	73	82	82	176	82	220	176	73	73	73
4	288	288	169	5	64	288	220	139	142	143
5	82	43	156	39	5	203	288	191	139	64
6	198	2	284	105	105	9	205	153	64	105
7	146	238	39	232	72	61	139	69	134	148
8	103	284	232	64	137	285	224	122	118	51
9	61	232	190	106	86	43	191	86	122	134
10	262	39	141	139	175	69	285	121	145	86
11	78	58	175	137	139	200	221	156	55	118
12	39	103	313	190	313	73	106	106	86	139
13	88	313	138	175	39	146	175	148	175	145
14	8	89	215	65	28	86	39	175	191	44
15	16	138	153	86	148	140	210	134	313	233
16	284	111	261	280	291	218	122	309	39	65
17	313	8	89	133	102	221	148	36	153	122
18	175	158	64	313	63	187	86	252	89	131
19	236	69	103	315	233	134	333	64	149	236
20	89	62	259	218	190	224	140	190	43	27
21	232	139	280	207	145	184	284	11	252	83
22	224	61	102	263	121	159	309	94	99	79
23	155	175	53	170	315	111	187	43	200	188
24	159	207	315	233	96	338	190	249	65	62
25	67	270	140	145	89	87	142	111	166	26
26	43	280	125	118	125	95	118	313	156	191
27	60	215	111	123	43	254	159	55	32	56
28	138	102	158	53	170	154	69	102	50	316
29	220	63	61	262	49	145	6	194	249	50
30	231	213	72	148	29	191	222	143	181	89

BOS BOSTON,MASS.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	5	73	73	13	17	215	189	189
2	196	170	170	170	170	215	61	176	215	215
3	82	73	73	176	176	14	170	234	170	36
4	58	82	189	232	232	61	159	13	16	64
5	201	196	232	82	64	203	197	73	64	73
6	170	189	82	64	33	10	176	64	73	105
7	158	232	207	315	82	197	284	258	191	232
8	59	197	197	227	36	242	91	197	153	13
9	73	187	187	197	49	266	13	91	36	226
10	233	248	33	246	32	288	175	175	141	50
11	175	284	64	33	316	234	140	191	137	148
12	8	227	216	39	227	17	266	139	123	51
13	284	246	316	36	197	175	191	153	121	247
14	172	233	246	265	246	284	139	170	247	258
15	176	175	248	49	175	176	242	242	233	37
16	4	8	125	175	236	275	268	187	128	48
17	269	138	260	248	248	78	145	86	147	46
18	248	33	227	236	266	146	248	113	205	38
19	92	39	32	288	180	92	64	226	149	142
20	271	61	141	32	72	233	73	266	86	197
21	33	172	39	128	48	91	92	284	51	49
22	182	260	284	48	229	145	38	122	256	191
23	138	251	259	256	288	82	50	118	307	260
24	251	258	247	84	226	101	35	137	38	106
25	208	230	172	239	333	136	288	148	266	74
26	62	247	106	316	31	244	233	38	224	255
27	288	208	84	66	309	216	96	313	46	86
28	214	36	49	34	339	338	75	32	248	32
29	39	80	8	79	336	88	243	140	236	236
30	211	141	309	113	276	50	339	248	34	248

MDW CHICAGO(MIDWAY),ILLINOIS

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	5	5	73	13	17	17	17	17
2	196	73	73	73	5	216	16	16	73	73
3	198	311	82	175	175	16	139	32	32	105
4	73	82	175	82	49	75	234	73	16	16
5	146	58	284	49	170	220	205	234	134	36
6	102	175	49	17	227	288	32	91	139	46
7	58	146	234	64	39	197	334	46	46	134
8	288	288	58	170	86	234	94	139	118	139
9	82	49	64	284	64	146	46	13	234	86
10	234	64	138	244	48	140	73	276	129	44
11	206	234	155	39	82	102	168	129	115	115
12	8	231	17	138	65	46	95	155	44	91
13	175	284	128	279	176	7	288	44	284	28
14	300	102	241	48	300	334	200	49	145	234
15	251	138	171	129	233	35	13	118	252	223
16	265	211	222	300	6	91	129	89	320	65
17	64	312	120	74	105	221	175	176	149	13
18	312	15	139	317	179	101	7	36	122	112
19	334	300	129	155	330	26	35	80	36	226
20	61	8	300	232	112	32	179	320	279	163
21	49	317	170	139	310	87	140	128	155	127
22	211	190	271	58	11	260	146	7	86	111
23	190	233	74	113	224	139	128	140	49	118
24	222	92	317	134	317	303	26	124	128	259
25	78	129	190	330	138	15	241	190	124	89
26	132	75	276	145	139	193	170	42	316	147
27	88	181	101	176	134	73	102	134	13	122
28	92	151	310	89	118	187	81	27	42	137
29	138	334	320	103	57	42	86	252	112	49
30	339	96	330	310	145	226	27	316	89	316

CLE CLEVELAND,OHIO

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	5	73	73	13	17	17	17	17
2	6	73	73	5	13	217	16	73	73	73
3	73	196	82	82	82	75	73	91	53	53
4	206	82	64	64	49	241	200	16	159	87
5	3	64	159	53	48	16	91	113	36	105
6	82	3	13	13	64	288	241	36	46	36
7	284	106	95	106	170	73	288	223	13	159
8	8	154	49	170	102	87	154	305	95	75
9	165	48	106	196	316	206	285	139	320	142
10	205	49	48	63	109	197	139	46	142	91
11	279	241	63	54	159	202	305	89	110	102
12	288	284	232	175	63	269	36	90	106	13
13	64	205	175	74	5	305	284	13	87	46
14	146	63	138	95	175	14	13	320	75	65
15	190	219	113	105	115	284	320	50	140	112
16	222	175	170	194	36	89	100	206	74	139
17	78	90	251	78	66	101	88	269	258	106
18	309	289	112	112	315	135	106	57	131	169
19	90	214	253	138	138	146	269	158	59	44
20	88	112	240	139	139	102	177	106	28	50
21	113	209	74	110	121	91	93	210	50	115
22	158	92	264	251	134	88	140	86	139	12
23	175	268	289	39	147	110	137	82	271	78
24	219	16	139	187	39	223	175	149	12	305
25	300	305	197	4	123	312	7	224	305	110
26	89	280	105	123	160	78	53	122	78	134
27	269	91	130	81	149	320	63	142	94	233
28	61	8	110	288	78	309	86	72	115	160
29	91	306	338	75	269	196	82	138	339	338
30	181	240	53	268	338	200	84	141	105	195

BAL BALTIMORE, MD.

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	5	73	73	13	215	215	215	36
2	338	82	36	36	36	219	284	36	36	215
3	82	36	73	269	315	215	269	73	73	73
4	258	284	269	315	82	334	205	220	176	64
5	315	73	315	15	16	232	279	176	15	16
6	279	232	284	176	64	197	36	269	64	176
7	61	279	82	82	33	161	139	284	232	315
8	170	197	15	170	176	288	288	139	142	142
9	284	315	197	49	49	315	176	205	153	105
10	4	288	314	64	170	11	92	64	139	86
11	73	314	49	33	66	92	16	232	315	65
12	1	241	176	103	74	187	315	55	86	82
13	314	172	170	215	63	285	220	191	111	63
14	172	49	172	139	108	284	248	32	82	15
15	92	170	138	66	103	140	175	175	49	303
16	258	234	64	316	247	220	73	122	244	325
17	78	4	139	244	86	241	285	146	303	51
18	8	269	33	288	139	144	113	121	118	139
19	36	138	113	232	137	176	64	137	175	26
20	207	178	8	303	55	106	148	86	57	134
21	269	248	66	69	242	269	122	113	137	118
22	58	8	156	115	325	234	172	26	288	46
23	67	89	232	8	34	17	55	156	55	261
24	106	110	244	78	303	248	26	124	191	49
25	242	92	115	176	15	139	32	255	26	147
26	144	33	316	55	284	226	191	337	105	284
27	49	255	124	191	261	190	310	99	78	314
28	150	259	248	137	310	199	143	276	109	53
29	309	317	190	7	105	61	17	315	124	290
30	43	190	78	138	194	175	140	38	339	29

TALLAHASSEE,FLORIDA

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	5	73	73	288	288	73	35	8
2	338	82	73	39	39	334	205	272	73	109
3	61	284	39	232	8	61	284	284	109	39
4	288	288	82	109	109	13	82	82	269	324
5	82	39	284	82	232	92	272	157	194	148
6	284	58	232	194	82	82	56	131	157	65
7	258	73	143	56	325	110	92	109	236	269
8	92	232	194	312	36	146	234	205	141	122
9	73	56	141	315	56	93	115	38	115	97
10	39	38	123	272	194	285	38	115	121	194
11	232	92	109	57	272	234	285	56	134	64
12	56	59	315	284	99	111	123	194	145	234
13	89	272	149	112	317	295	99	232	143	239
14	93	36	272	36	74	56	110	91	123	98
15	110	236	236	121	300	272	148	64	239	236
16	312	123	288	141	5	230	141	110	234	73
17	8	8	38	156	175	119	143	141	337	51
18	146	269	95	167	98	94	194	137	46	86
19	58	160	300	289	122	86	167	121	95	108
20	250	49	36	257	64	303	303	123	64	46
21	233	95	171	131	254	222	112	337	272	56
22	83	312	269	236	121	115	289	143	309	322
23	90	110	137	72	141	156	64	234	56	30
24	191	115	115	142	172	325	337	147	289	29
25	58	233	121	123	137	250	73	148	35	288
26	95	149	333	137	110	193	91	99	111	289
27	257	143	191	148	337	91	236	333	86	276
28	7	141	56	145	271	118	86	95	50	99
29	38	191	147	300	276	150	175	149	105	336
30	112	112	197	50	108	60	134	289	331	38

CVG CINCINNATI(COVINGTON),OHIO

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	6	5	73	73	17	17	17	17	17
2	206	73	73	82	82	216	284	73	73	74
3	207	284	82	5	64	75	197	284	315	142
4	73	82	284	64	5	267	269	232	139	315
5	61	61	64	103	49	288	219	139	122	82
6	269	219	58	49	39	222	139	32	309	105
7	288	64	78	78	315	197	288	252	153	139
8	284	58	232	250	159	146	73	122	142	115
9	7	170	88	170	78	113	134	161	110	159
10	8	78	141	141	121	269	32	81	81	44
11	334	269	110	57	175	201	266	190	175	118
12	58	8	170	175	190	87	113	91	118	137
13	82	88	288	190	141	92	81	44	89	73
14	318	113	123	284	137	276	250	148	28	86
15	113	95	49	39	57	135	91	89	148	122
16	146	288	233	112	147	140	232	102	137	147
17	92	232	260	232	122	246	145	170	147	28
18	64	49	214	126	170	232	170	88	99	112
19	242	144	190	74	300	107	144	63	252	36
20	67	234	106	123	140	119	88	153	36	190
21	93	103	112	92	63	164	13	90	54	311
22	78	209	95	317	105	260	226	26	161	175
23	270	196	63	110	248	175	140	191	190	332
24	276	233	250	121	112	73	270	143	191	126
25	231	280	8	214	336	285	102	175	86	110
26	55	190	317	288	74	27	190	118	103	66
27	191	175	126	138	317	334	100	103	138	54
28	309	138	72	63	232	193	26	267	88	131
29	319	123	337	36	126	98	196	110	156	191
30	76	260	143	115	113	81	103	142	159	92

LOUISVILLE, KENTUCKY

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	332	332	73	73	73	333	17	17	215	215
2	144	73	82	82	82	17	146	73	222	315
3	82	82	5	332	332	146	222	269	154	16
4	196	144	150	64	64	241	288	139	139	105
5	8	233	64	49	49	222	269	154	315	73
6	198	61	284	170	105	288	139	123	123	86
7	233	284	259	141	315	251	205	28	121	142
8	61	49	49	232	39	221	285	284	115	269
9	89	2	175	112	308	256	311	118	221	49
10	73	280	58	154	175	197	81	148	153	149
11	146	175	141	123	121	149	94	81	73	115
12	288	138	170	121	141	269	68	46	86	46
13	49	64	123	150	112	89	86	49	269	118
14	219	288	8	74	137	16	180	153	134	141
15	259	95	138	189	58	285	123	26	46	65
16	64	259	115	50	170	215	92	115	28	28
17	175	226	95	300	232	131	221	222	148	31
18	289	285	105	95	74	187	256	86	145	305
19	95	146	300	105	123	81	115	221	309	112
20	222	93	69	309	46	184	223	58	49	95
21	88	300	53	151	66	32	89	137	156	309
22	231	170	286	66	55	49	46	97	150	87
23	214	123	154	[illegible]	145	26	121	39	305	97
24	138	320	231	234	252	305	148	138	63	64
25	269	16	112	269	96	59	39	170	131	200
26	113	55	72	246	269	115	320	143	138	108
27	132	191	55	315	337	91	218	131	87	252
28	93	216	191	39	270	160	305	98	211	134
29	59	112	216	115	110	111	49	273	155	31
30	111	90	317	58	140	307	284	146	232	332

JFK NEW YORK(KENNEDY),N.Y.

ELEMENT	CEILING ECUATIONS					VISIBILITY ECUATIONS				
FROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	332	332	332	73	73	17	215	205	189	189
2	6	315	315	36	36	6	6	17	215	215
3	82	82	73	33	315	197	197	176	36	64
4	232	6	36	5	176	13	13	6	39	142
5	73	58	82	189	33	14	288	139	227	73
6	195	36	58	315	64	11	190	64	64	105
7	170	73	33	64	7	78	266	73	73	36
8	58	232	196	82	227	59	46	191	141	39
9	7	33	172	172	49	334	139	210	64	227
10	33	88	314	227	82	190	88	190	266	137
11	59	172	64	314	65	312	41	36	153	50
12	175	314	232	58	231	41	187	91	92	92
13	172	284	39	49	6	136	36	38	191	16
14	258	227	190	92	175	266	284	92	137	315
15	190	190	49	39	172	284	220	227	140	86
16	284	59	227	30	30	170	64	122	122	272
17	169	266	30	246	137	277	191	176	206	118
18	269	8	169	288	197	175	91	272	86	141
19	36	312	170	7	246	68	210	148	118	42
20	334	167	246	231	109	86	134	266	205	51
21	30	64	247	247	331	106	73	248	147	145
22	8	138	141	48	110	187	17	337	187	266
23	312	30	189	66	48	101	140	312	149	46
24	255	39	269	74	78	3	122	118	288	187
25	138	49	214	110	39	134	148	220	46	55
26	187	214	92	143	29	91	312	138	97	288
27	297	277	337	166	92	288	196	315	315	191
28	125	337	248	270	284	215	175	3	55	311
29	78	247	261	193	122	205	103	16	38	209
30	106	246	191	279	191	145	55	129	272	279

PIT PITTSBURGH,PENNSYLVANIA

ELEMENT	CEILING EQUATIONS					VISIBILITY EQUATIONS				
PROJECTION	4	7	10	13	16	4	7	10	13	16
TERM										
1	5	5	73	73	73	13	17	17	73	17
2	206	73	82	82	82	217	58	139	142	142
3	73	82	5	64	64	197	139	91	17	74
4	6	284	150	269	269	288	159	191	153	105
5	82	150	64	49	49	220	134	176	53	53
6	146	58	276	48	48	17	91	284	44	44
7	198	276	269	189	189	26	150	122	139	311
8	288	64	49	74	74	146	288	148	50	32
9	150	269	288	284	159	269	269	73	161	50
10	269	288	48	150	36	139	26	175	127	149
11	56	78	58	161	63	150	73	39	150	159
12	92	49	284	63	112	92	32	276	32	134
13	78	7	63	112	105	132	148	266	51	139
14	64	146	189	139	142	266	122	150	220	118
15	276	88	138	191	78	279	266	118	134	145
16	8	95	139	36	272	222	200	252	110	51
17	135	309	315	137	215	91	189	226	122	78
18	110	8	191	109	84	134	88	270	147	73
19	309	136	92	58	270	137	146	26	148	337
20	220	190	270	310	104	32	113	32	99	173
21	59	280	337	270	113	135	143	137	332	46
22	49	291	55	138	339	291	191	143	46	88
23	284	170	112	39	88	334	145	97	26	39
24	90	310	90	315	134	73	220	332	191	270
25	84	214	113	118	139	145	219	50	173	112
26	106	63	91	122	118	48	291	145	337	300
27	280	48	109	148	145	61	50	105	97	249
28	334	280	83	145	252	277	35	265	109	26
29	190	232	76	190	315	136	222	131	145	65
30	67	337	65	78	190	101	85	265	92	122

APPENDIX D

MOST FREQUENTLY CHOSEN PREDICTORS

This appendix lists, in order, the 100 most frequently chosen predictors for all 10 equations for the 20 terminals identified in Table 1(a). The predictors are identified by number as given in Appendix A.

FREQUENCY RANK	PREDICTOR NUMBER	NUMBER OF TIMES SELECTED	FREQUENCY RANK	PREDICTOR NUMBER	NUMBER OF TIMES SELECTED
1	73	188	51	55	36
2	82	129	52	46	36
3	64	115	53	146	35
4	284	112	54	109	35
5	288	105	55	309	34
6	232	95	56	189	34
7	269	94	57	106	34
8	36	91	58	102	34
9	175	87	59	222	33
10	139	83	60	205	33
11	190	74	61	74	33
12	170	74	62	215	32
13	315	71	63	89	32
14	49	71	64	63	32
15	5	71	65	176	31
16	8	69	66	66	31
17	115	67	67	48	31
18	39	63	68	78	30
19	141	61	69	337	28
20	103	61	70	16	28
21	86	60	71	289	27
22	112	58	72	108	27
23	92	58	73	90	27
24	138	56	74	75	27
25	191	54	75	7	27
26	17	54	76	196	26
27	137	53	77	172	26
28	148	50	78	99	25
29	122	50	79	50	25
30	123	49	80	32	25
31	197	48	81	317	24
32	61	48	82	276	24
33	145	47	83	159	24
34	140	47	84	65	24
35	91	45	85	334	23
36	134	44	86	285	23
37	118	44	87	280	23
38	113	44	88	266	23
39	121	42	89	155	23
40	105	42	90	153	23
41	58	42	91	147	23
42	33	42	92	26	23
43	13	42	93	220	22
44	95	41	94	150	22
45	300	39	95	149	22
46	88	39	96	56	22
47	234	38	97	252	21
48	233	38	98	248	21
49	110	38	99	143	21
50	142	36	100	87	21

APPENDIX E

ORDER OF SELECTION OF PREDICTORS BY PREDICTOR

This appendix gives the order of selection for each predictor chosen a minimum of 40 times (the first 44 listed in Appendix D) for each equation and each of the 20 terminals listed in Table 1(a). The predictors are identified by number as given in Appendix A. The terminals are coded as follows:

SAV	Savannah, Ga.
MSY	New Orleans, La.
RAL	Raleigh-Durham, N. C.
DCA	Washington (National), D. C.
ATL	Atlanta, Ga.
BHM	Birmingham, Ala.
KNO	Knoxville, Tenn.
BNA	Nashville, Tenn.
STL	St. Louis, Mo.
BUF	Buffalo, N. Y.
ALB	Albany, N. Y.
BOS	Boston, Mass.
MDW	Chicago (Midway), Ill.
CLE	Cleveland, Ohio
BAL	Baltimore, Md.
TAL	Tallahassee, Fla.
CVG	Cincinnati, Ohio
LOU	Louisville, Ky.
JFK	New York (Kennedy), N. Y.
PIT	Pittsburgh, Pa.

PREDICTOR 5

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	1	1	1	0	0	0	0	0	0	0
MSY	1	1	19	0	17	0	0	0	0	0
RAL	1	1	0	0	0	0	0	0	0	0
DCA	1	1	0	0	0	3	2	0	0	0
ATL	1	1	0	0	0	0	0	0	0	0
BHM	1	1	0	0	0	0	0	0	0	0
KNO	1	1	3	3	3	0	0	0	0	0
BNA	1	1	1	0	0	0	0	0	0	0
STL	1	1	1	1	10	0	0	20	0	6
BUF	1	1	2	0	0	0	0	0	0	0
A S	1	1	1	4	5	0	0	0	0	0
BOS	1	1	1	0	0	0	0	0	0	0
MDW	1	1	1	1	2	0	0	0	0	0
CLE	1	1	1	2	13	0	0	0	0	0
BAL	1	1	1	0	0	0	0	0	0	0
TAL	1	1	1	0	16	0	0	0	0	0
CVG	1	1	1	3	4	0	0	0	0	0
LOU	0	0	3	0	0	0	0	0	0	0
JFK	0	0	0	4	13	0	0	0	0	0
PIT	1	1	3	0	0	0	0	0	0	0

PREDICTOR 8

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	13	12	11	6	6	0	0	0	0	1
MSY	6	5	1	1	1	0	0	0	0	0
RAL	11	11	4	4	4	0	0	0	0	1
DCA	6	13	1	5	11	0	0	0	0	0
ATL	23	0	0	0	0	0	0	0	0	27
BHM	26	19	4	0	27	0	0	0	0	0
KNO	5	7	10	9	0	0	0	0	0	18
BNA	6	9	10	4	0	0	0	0	0	27
STL	13	12	0	0	0	0	0	0	0	0
BUF	14	19	0	0	0	0	0	0	0	0
A S	14	17	0	0	0	0	0	0	0	0
BOS	12	16	29	0	0	0	0	0	0	0
MDW	12	20	0	0	0	0	0	0	0	0
CLE	8	28	0	0	0	0	0	0	0	0
BAL	18	22	20	23	0	0	0	0	0	0
TAL	17	17	0	0	3	0	0	0	0	1
CVG	10	12	25	0	0	0	0	0	0	0
LOU	5	9	14	0	0	0	0	0	0	0
JFK	22	18	0	0	0	0	0	0	0	0
PIT	16	18	0	0	0	0	0	0	0	0

PREDICTOR 13

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	0	0	0	0
MSY	0	0	0	0	0	2	0	0	0	1
RAL	0	0	0	0	0	1	0	0	0	0
DCA	0	0	0	0	0	7	0	3	5	0
ATL	0	0	0	0	0	10	0	0	0	0
BHM	0	0	0	0	0	11	0	0	0	0
KNO	0	0	0	0	0	1	0	0	0	0
BNA	0	0	0	0	0	1	0	0	0	0
STL	0	0	0	0	0	1	1	0	0	0
BUF	0	0	0	0	0	1	1	3	4	5
A S	0	0	0	0	0	1	0	0	0	0
BOS	0	0	0	0	0	1	9	4	0	0
MDW	0	0	0	0	0	1	15	9	27	17
CLE	0	0	6	6	2	1	14	13	7	12
BAL	0	0	0	0	0	1	0	0	0	0
TAL	0	0	0	0	0	4	0	0	0	0
CVG	0	0	0	0	0	1	21	0	0	0
LOU	0	0	0	0	0	1	0	0	0	0
JFK	0	0	0	0	0	4	4	0	0	0
PIT	0	0	0	0	0	1	0	0	0	0

PREDICTOR 17

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	1	1	0	0	0
MSY	0	0	0	0	0	0	1	0	4	0
RAL	0	0	0	0	0	0	0	0	0	0
DCA	0	0	0	0	0	1	1	0	0	2
ATL	0	0	0	0	0	0	0	20	0	0
BHM	0	0	0	0	0	0	0	0	0	0
KNO	0	0	0	0	0	5	1	0	4	2
BNA	0	0	0	0	0	0	1	0	0	2
STL	0	27	6	0	0	0	0	1	1	1
BUF	0	0	0	22	0	12	0	0	0	0
ALB	0	0	0	0	0	0	1	1	1	1
BOS	0	0	0	0	0	12	1	0	0	0
MDW	0	0	12	6	0	0	1	1	1	1
CLE	0	0	0	0	0	0	1	1	1	1
BAL	0	0	0	0	0	23	29	0	0	0
TAL	0	0	0	0	0	0	0	0	0	0
CVG	0	0	0	0	0	0	1	1	1	1
LOU	0	0	0	0	0	2	1	1	0	0
JFK	0	0	0	0	0	1	22	2	0	0
PIT	0	0	0	0	0	5	1	1	3	1

PREDICTOR 33

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	22	13	8	5	0	0	0	23	0
MSY	0	27	17	18	25	0	0	0	0	0
RAL	0	13	9	15	10	0	0	0	0	0
DCA	19	16	12	18	0	0	0	0	0	0
ATL	0	20	22	7	6	0	0	5	23	11
BHM	0	0	0	17	10	0	0	0	0	0
KNO	0	0	0	0	0	0	0	0	0	0
BNA	0	0	0	0	0	0	0	0	0	0
STL	0	0	0	15	0	0	0	0	0	0
BUF	0	20	0	0	0	0	0	0	0	0
ALB	0	0	0	0	0	0	0	0	0	0
BOS	21	18	13	11	6	0	0	0	0	0
MDW	0	0	0	0	0	0	0	0	0	0
CLE	0	0	0	0	0	0	0	0	0	0
BAL	0	26	18	11	7	0	0	0	0	0
TAL	0	0	0	0	0	0	0	0	0	0
CVG	0	0	0	0	0	0	0	0	0	0
LOU	0	0	0	0	0	0	0	0	0	0
JFK	10	9	7	3	5	0	0	0	0	0
PIT	0	0	0	0	0	0	0	0	0	0

PREDICTOR 36

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	9	18	13	12	4	1	1	2
MSY	0	0	0	7	0	0	0	0	12	0
RAL	20	19	5	6	9	29	7	5	7	21
DCA	0	11	4	4	3	0	15	[illegible]	2	3
ATL	22	0	15	23	17	0	20	[illegible]	3	3
BHM	0	16	19	22	20	0	0	0	0	0
KNO	0	0	0	0	0	0	0	0	0	0
BNA	0	0	0	21	0	0	0	0	0	20
STL	0	0	0	0	23	0	18	12	3	3
BUF	0	0	0	0	24	0	0	0	0	29
ALB	0	0	0	0	0	0	0	0	0	0
BOS	0	28	0	13	0	0	0	0	9	3
MDW	0	0	0	0	0	0	0	18	19	5
CLE	0	0	0	0	6	0	12	6	5	6
BAL	19	3	2	2	2	0	6	2	2	1
TAL	0	14	20	14	0	0	0	0	0	0
CVG	0	0	0	29	0	0	0	0	20	19
LOU	0	[illegible]	0	0	0	0	0	0	0	0
JFK	19	6	4	2	2	0	13	11	3	7
PIT	0	0	0	16	10	0	0	0	0	0

PREDICTOR 39

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	0	0	0	0
MSY	29	10	7	5	5	0	0	0	16	0
RAL	19	21	18	19	14	0	0	0	0	0
DCA	29	0	0	0	0	0	0	0	0	0
ATL	0	0	28	29	16	0	0	0	0	13
BHM	0	0	5	4	4	0	0	0	0	0
KNO	0	0	0	0	0	0	0	0	0	0
BNA	0	23	15	15	5	0	0	0	0	0
STL	0	0	0	0	0	0	0	0	0	0
BUF	0	0	0	0	29	0	0	0	28	0
ALB	12	10	7	5	13	0	14	17	16	0
BOS	29	15	21	12	0	0	0	0	0	0
MDW	0	0	0	11	7	0	0	0	0	0
CLE	0	0	0	23	24	0	0	0	0	0
BAL	0	0	0	0	0	0	0	0	0	0
TAL	10	5	3	2	2	0	0	0	1	3
CVG	0	0	0	15	6	0	0	0	0	0
LOU	0	0	0	28	8	0	25	23	0	0
JFK	0	24	13	15	25	0	0	0	4	8
PIT	0	0	0	23	0	0	0	11	0	23

PREDICTOR 49

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	0	0	0	0
MSY	0	0	0	0	0	0	0	0	0	0
RAL	0	0	19	28	12	0	0	0	0	0
DCA	0	0	0	0	0	0	19	20	10	0
ATL	0	0	0	0	0	0	0	0	0	0
BHM	0	0	0	0	21	0	0	0	14	0
KNO	20	12	0	0	0	25	0	0	0	0
BNA	0	0	0	0	0	0	0	0	0	0
STL	0	26	12	6	5	23	22	15	0	0
BUF	20	10	7	5	4	0	0	0	19	0
ALB	0	0	0	0	29	0	0	0	0	0
BOS	0	0	28	15	9	0	0	0	0	21
MDW	21	9	6	5	4	0	0	14	23	29
CLE	0	10	8	0	4	0	0	0	0	0
BAL	27	14	11	9	9	0	0	0	15	24
TAL	0	20	0	0	0	0	0	0	0	0
CVG	0	18	15	6	5	0	0	0	0	0
LOU	13	8	8	5	5	22	29	13	20	9
JFK	0	25	15	13	9	0	0	0	0	0
PIT	22	12	8	5	5	0	0	0	0	0

PREDICTOR 58

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 15	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	0	0	0	17
MSY	28	0	0	0	0	0	0	0	0	0
RAL	0	0	0	0	0	0	0	0	0	0
DCA	8	0	0	0	0	0	0	0	0	0
ATL	0	0	0	0	0	0	0	0	0	0
BHM	13	9	0	0	0	12	0	7	0	0
KNO	6	8	0	13	0	0	2	0	0	0
BNA	0	0	20	22	0	0	0	0	0	0
STL	10	7	13	0	0	11	0	0	0	0
BUF	0	0	0	0	0	0	0	0	0	28
ALB	0	11	0	0	0	0	0	0	0	0
BOS	4	0	0	0	0	0	0	0	0	0
MDW	7	5	8	22	0	0	0	0	0	0
CLE	0	0	0	0	0	0	0	0	0	0
BAL	22	0	0	0	0	0	0	0	0	0
TAL	15	6	0	0	0	0	0	0	0	0
CVG	12	8	6	0	0	0	0	0	0	0
LOU	0	0	10	30	15	0	0	28	0	0
JFK	8	5	6	12	0	0	0	0	0	0
PIT	11	6	11	19	0	0	2	0	0	0

PREDICTOR 61

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	6	9	0	0	0	5	0	0	12	22
MSY	12	0	0	0	0	6	0	0	0	0
RAL	4	5	0	0	0	5	14	0	0	17
DCA	0	0	0	0	0	0	0	0	0	23
ATL	3	6	23	0	0	6	5	0	0	0
BHM	7	6	0	0	0	4	19	3	0	0
KNO	8	0	0	0	0	2	0	0	0	0
BNA	7	0	0	0	0	6	0	0	0	0
STL	0	0	0	0	0	0	0	0	0	0
BUF	21	23	0	0	0	30	0	0	0	0
ALB	9	22	29	0	0	7	0	0	0	0
BOS	0	20	0	0	0	4	2	0	0	0
MDW	29	0	0	0	0	0	0	0	0	0
CLE	28	0	0	0	0	0	0	0	0	0
BAL	7	0	0	0	0	29	0	0	0	0
TAL	3	0	0	0	0	3	0	0	0	0
CVG	5	5	0	0	0	0	0	0	0	0
LOU	4	6	0	0	0	0	0	0	0	0
JFK	0	0	0	0	0	0	0	0	0	0
PIT	0	0	0	0	0	27	0	0	0	0

PREDICTOR 64

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	25	23	16	10
MSY	23	16	16	0	0	0	0	0	0	0
RAL	0	0	24	11	6	0	17	18	11	6
DCA	0	28	11	6	5	0	21	10	6	4
ATL	0	18	14	17	15	0	19	10	12	9
BHM	0	0	0	0	0	0	0	0	0	0
KNO	21	10	6	5	8	0	0	23	19	8
BNA	29	12	8	7	10	0	0	0	0	0
STL	0	21	16	11	7	0	0	0	0	0
BUF	9	4	3	4	5	19	22	23	0	27
ALB	0	0	18	9	4	0	0	19	6	5
BOS	0	0	11	6	5	0	19	6	5	4
MDW	17	10	9	7	9	0	0	0	0	0
CLE	13	5	4	4	6	0	0	0	0	0
BAL	0	0	16	10	6	0	19	10	6	4
TAL	0	0	0	0	20	0	23	15	20	11
CVG	18	7	5	4	3	0		0	0	0
LOU	16	13	5	4	4	0	0	0	0	24
JFK	0	21	11	7	6	0	16	6	6	3
PIT	14	8	5	3	3	0	0	0	0	0

PREDICTOR 73

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	8	4	3	1	1	0	0	4	3	25
MSY	10	3	3	2	2	0	22	19	3	3
RAL	8	3	1	1	1	17	5	1	1	18
DCA	14	6	5	1	1	0	14	6	3	1
ATL	7	4	1	1	1	0	5	2	1	1
BHM	6	3	1	1	1	26	4	2	1	1
KNO	12	3	2	1	1	0	17	3	1	1
BNA	11	3	2	1	1	17	6	3	2	1
STL	4	2	2	2	1	25	14	3	2	2
BUF	3	2	1	1	1	8	4	2	2	2
ALB	3	2	2	1	1	12	2	3	3	3
BOS	9	3	3	1	1	0	20	5	6	5
MDW	4	2	2	2	1	27	10	4	2	2
CLE	3	2	2	1	1	7	3	2	2	2
BAL	11	5	3	1	1	0	16	3	3	3
TAL	9	7	2	1	1	0	25	1	2	16
CVG	4	2	2	1	1	24	8	2	2	13
LOU	10	2	1	1	1	0	0	2	11	5
JFK	5	7	3	1	1	0	21	7	7	5
PIT	3	2	1	1	1	24	11	9	1	18

PREDICTOR 92

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	4	2	2	3	3	0	0	0	0	0
MSY	7	4	5	6	9	11	12	0	0	0
RAL	3	[illegible]	2	2	3	3	9	0	0	4
DCA	3	[illegible]	2	3	4	25	22	27	0	21
ATL	5	2	2	3	11	4	0	1	0	0
BHM	3	2	2	2	2	24	0	13	8	8
KNO	2	2	1	2	2	12	3	12	0	9
BNA	3	2	3	3	2	0	2	0	0	8
STL	6	4	4	4	4	0	0	0	0	0
BUF	0	[illegible]	5	2	3	0	0	0	0	0
ALB	5	3	3	2	3	0	0	0	0	0
BOS	3	4	6	5	7	23	0	0	0	0
MDW	9	4	3	4	11	0	0	0	0	0
CLE	6	4	3	3	3	0	29	23	0	0
BAL	3	2	7	7	4	0	0	0	14	12
TAL	5	2	4	5	6	6	4	4	0	0
CVG	13	4	3	2	2	0	0	0	0	5
LOU	3	3	2	2	2	0	0	0	0	0
JFK	3	3	5	6	10	0	0	0	0	0
PIT	5	3	2	2	2	0	0	0	0	0

PREDICTOR 06

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	19	10	14	13	0
MSY	0	0	0	0	0	18	16	14	0	24
RAL	0	0	0	0	0	0	23	0	0	0
DCA	0	0	0	0	0	0	0	0	0	0
ATL	0	0	0	0	0	0	0	0	0	0
BHM	0	0	0	0	0	25	0	16	0	25
KNO	0	0	0	0	0	0	0	25	0	0
BNA	0	0	0	0	0	0	19	24	0	18
STL	0	15	18	8	6	24	17	16	27	20
BUF	0	0	0	0	0	0	0	0	25	0
ALB	0	0	0	15	9	14	18	9	12	10
BOS	0	0	0	0	0	0	0	17	20	27
MDW	0	0	0	0	8	0	29	0	22	9
CLE	0	0	0	0	0	0	28	22	0	0
BAL	0	0	0	0	17	0	0	20	12	10
TAL	0	0	0	0	0	19	28	0	27	18
CVG	0	0	0	0	0	0	0	0	25	14
LOU	0	0	0	0	0	0	13	18	12	6
JFK	0	0	0	0	0	20	0	0	18	15
PIT	0	0	0	0	0	0	0	0	0	0

PREDICTOR 91

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	0	0	0	19
MSY	0	0	0	0	20	26	20	9	0	0
RAL	0	0	0	0	0	0	0	4	0	14
DCA	0	0	0	24	0	10	10	13	0	0
ATL	0	0	0	0	0	0	0	0	0	0
BHM	0	0	0	0	0	0	0	11	0	0
KNO	0	24	0	0	0	0	10	0	20	0
BNA	0	0	0	0	0	26	0	0	0	0
STL	0	0	0	0	0	30	11	6	0	0
BUF	0	0	0	0	0	0	0	0	0	0
ALB	0	0	0	0	0	0	0	0	0	0
BOS	0	0	0	0	0	21	0	9	[illegible]	0
MDW	0	0	0	0	0	16	0	6	0	12
CLE	29	27	0	0	0	21	5	3	0	10
BAL	0	0	0	0	[illegible]	0	0	0	0	0
TAL	0	0	0	0	0	27	26	14	0	0
CVG	0	0	0	0	0	0	15	12	0	0
LOU	0	0	0	0	0	27	0	0	0	0
JFK	0	0	0	0	0	26	10	12	0	0
PIT	0	0	26	0	0	17	6	[illegible]	13	0

PREDICTOR 92

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	6	8	0	0	0
MSY	0	0	0	0	0	5	8	0	0	0
RAL	0	0	0	0	0	7	26	0	0	0
DCA	26	4	0	0	0	2	3	0	0	0
ATL	18	0	0	0	0	5	13	0	0	0
BHM	10	0	0	0	0	6	8	0	0	0
KNO	17	0	0	0	0	13	12	22	0	0
BNA	13	0	0	0	0	13	14	0	0	0
STL	0	0	0	0	0	9	0	0	0	0
BUF	0	26	28	0	0	0	19	0	18	0
ALB	0	0	0	0	0	0	0	0	0	0
BOS	19	0	0	0	0	19	21	0	0	0
MDW	28	24	0	0	0	0	0	0	0	0
CLE	0	22	0	0	0	0	0	0	0	0
BAL	15	25	0	0	0	11	11	0	0	0
TAL	8	11	0	0	0	5	7	0	0	0
CVG	17	0	0	21	0	13	0	0	0	30
LOU	0	0	0	0	0	21	16	0	0	0
JFK	0	0	26	14	27	0	0	14	12	12
PIT	12	0	19	0	0	12	0	0	30	0

PREDICTOR 95

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	16	22	0	0	0	0	0	0	0
MSY	0	21	0	0	0	0	14	17	0	21
RAL	0	0	0	0	0	0	0	0	0	0
DCA	0	0	0	0	0	0	0	0	24	0
ATL	0	0	0	0	0	0	24	0	24	0
BHM	0	21	0	0	0	0	16	0	27	0
KNO	0	0	13	0	0	0	0	0	0	0
BNA	0	0	0	0	0	0	0	0	0	0
STL	0	20	20	0	0	0	0	0	0	0
BUF	0	17	12	14	0	24	11	4	6	10
ALB	0	0	0	0	0	26	0	0	0	0
BOS	0	0	0	0	0	0	0	0	0	0
MDW	0	0	0	0	0	0	12	0	0	0
CLE	0	0	7	14	0	0	0	0	8	0
BAL	0	0	0	0	0	0	0	0	0	0
TAL	26	21	18	0	0	0	0	28	19	0
CVG	0	15	22	0	0	0	0	0	0	0
LOU	19	15	17	18	0	0	0	0	0	20
JFK	0	0	0	0	0	0	0	0	0	0
PIT	0	16	0	0	0	0	0	0	0	0

PREDICTOR 103

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	23	5	0	22	0	0	0	12
MSY	0	0	15	13	13	0	0	0	17	17
RAL	26	25	25	0	0	15	15	11	6	13
DCA	0	0	0	0	0	0	0	0	0	0
ATL	21	15	11	6	5	0	23	14	7	5
BHM	0	25	0	24	0	0	0	0	0	0
KNO	0	0	8	16	16	0	0	26	24	16
BNA	0	0	6	14	0	0	0	20	0	0
STL	0	28	11	10	18	0	16	9	5	13
BUF	0	0	0	17	26	0	0	0	0	0
ALB	8	12	19	0	0	0	0	0	0	0
BOS	0	0	0	0	0	0	0	0	0	0
MDW	0	0	0	29	0	0	0	0	0	0
CLE	0	0	0	0	0	0	0	0	0	0
BAL	0	0	0	12	15	0	0	0	0	0
TAL	0	0	0	0	0	0	0	0	0	0
CVG	0	21	0	5	0	0	30	27	26	0
LOU	0	0	0	0	0	0	0	0	0	0
JFK	0	0	0	0	0	0	29	0	0	0
PIT	0	0	0	0	0	0	0	0	0	0

PREDICTOR 105

	CIG					VIS				
STATION	4	7	10	13	16	4	7	10	13	16
SAV	0	0	0	0	0	0	0	0	0	29
MSY	0	14	0	0	0	0	0	10	2	26
RAL	0	0	0	0	0	0	0	0	0	19
DCA	0	0	0	23	16	0	0	0	0	5
ATL	0	0	0	0	27	0	0	0	0	17
BHM	0	0	0	0	0	0	0	0	0	0
KNO	0	0	0	0	5	0	0	0	0	5
BNA	0	0	0	0	0	0	0	0	0	0
STL	0	0	0	0	0	0	0	0	0	4
BUF	0	0	26	18	14	0	0	0	0	9
ALB	0	0	0	6	6	0	0	0	0	6
BOS	0	0	0	0	0	0	0	0	0	6
MDW	0	0	0	0	17	0	0	0	0	3
CLE	0	0	26	15	0	0	0	0	33	5
BAL	0	0	0	0	29	0	0	0	26	9
TAL	0	0	0	0	0	0	0	0	29	0
CVG	0	0	0	0	22	0	0	0	0	6
LOU	0	0	18	19	6	0	0	0	0	4
JFK	0	0	0	0	0	0	0	0	0	6
PIT	0	0	0	0	13	0	0	27	0	4

PREDICTOR 112

	CIG					VIS				
STATION	4	7	10	13	16	4	7	10	13	16
SAV	0	0	0	0	0	0	0	0	25	0
MSY	16	9	9	10	0	0	0	21	20	0
RAL	0	0	26	0	0	0	19	0	29	0
DCA	0	0	25	0	0	0	0	0	0	0
ATL	0	0	19	0	0	0	26	24	0	0
BHM	23	27	12	23	0	0	0	0	0	30
KNO	0	14	20	19	11	0	0	0	0	0
BNA	27	30	0	0	16	0	0	0	0	0
STL	27	0	30	23	22	0	0	0	30	0
BUF	0	0	0	12	16	0	0	0	0	11
ALB	0	0	0	0	0	0	0	0	0	0
BOS	0	0	0	0	0	0	0	0	0	0
MDW	0	0	0	0	22	0	0	0	29	16
CLE	0	20	18	18	0	0	0	0	0	15
BAL	0	0	0	0	0	0	0	0	0	0
TAL	30	30	0	13	0	0	21	0	0	0
CVG	0	0	21	16	24	0	0	0	0	18
LOU	0	29	25	9	13	0	0	0	0	19
JFK	0	0	0	0	0	0	0	0	0	0
PIT	0	0	23	13	12	0	0	0	0	25

PREDICTOR 113

	CIG					VIS				
STATION	4	7	10	13	16	4	7	10	13	16
SAV	0	26	0	0	0	0	12	10	0	0
MSY	0	0	0	0	0	0	11	0	13	29
RAL	0	0	0	0	0	10	0	0	0	0
DCA	0	0	0	0	0	0	26	0	0	0
ATL	19	0	0	0	0	7	0	0	0	0
BHM	30	11	16	0	0	15	9	5	5	4
KNO	0	0	17	0	0	0	28	0	0	0
BNA	0	0	0	0	0	0	0	0	0	0
STL	0	13	0	0	0	7	3	0	12	0
BUF	0	0	0	0	0	26	0	0	0	12
ALB	0	0	0	0	0	0	0	0	0	0
BOS	0	0	0	30	0	0	0	10	0	0
MDW	0	0	0	0	0	0	0	0	0	0
CLE	21	0	15	0	0	0	0	5	0	0
BAL	0	0	19	0	0	0	10	21	0	0
TAL	0	0	0	0	0	0	0	0	0	0
CVG	15	14	0	0	30	9	12	0	0	0
LOU	26	0	0	0	0	0	0	0	0	0
JFK	0	0	0	0	0	0	0	0	0	0
PIT	0	0	25	0	21	0	20	0	0	0

PREDICTOR 115

	CIG					VIS				
STATION	4	7	10	13	16	4	7	10	13	16
SAV	0	15	8	0	0	13	21	10	0	0
MSY	0	13	12	30	0	28	9	6	4	0
RAL	0	29	0	0	0	0	0	0	0	0
DCA	30	21	0	22	0	0	24	24	18	17
ATL	0	0	0	0	0	0	0	0	0	0
BHM	0	0	30	0	0	0	0	23	17	0
KNO	0	19	11	7	7	17	11	10	20	25
BNA	0	13	7	6	0	23	11	5	6	16
STL	0	0	0	0	0	0	0	0	24	17
BUF	0	0	29	0	0	0	0	0	30	21
ALB	0	0	0	0	0	0	0	0	0	0
BOS	0	0	0	0	0	0	0	0	0	0
MDW	0	0	0	0	0	0	0	0	11	11
CLE	0	0	0	0	15	0	0	0	28	21
BAL	0	0	25	22	0	0	0	0	0	0
TAL	0	24	24	0	0	22	0	13	9	0
CVG	0	0	0	30	0	0	0	0	0	8
LOU	0	0	16	29	0	25	19	16	5	11
JFK	0	0	0	0	0	0	0	0	0	0
PIT	0	0	0	0	0	0	0	0	0	0

PREDICTOR 118

	CIG					VIS				
STATION	4	7	10	13	16	4	7	10	13	16
SAV	0	0	0	24	0	0	0	19	19	0
MSY	0	0	0	0	0	0	0	0	0	0
RAL	0	0	0	0	0	0	0	0	0	0
DCA	0	0	0	0	22	0	0	22	11	11
ATL	0	0	0	0	0	0	0	0	0	0
BHM	0	0	0	0	26	0	0	0	0	0
KNO	0	0	0	12	13	0	0	15	8	12
BNA	0	0	0	0	0	0	0	10	13	17
STL	0	0	0	0	0	0	0	0	0	0
BUF	0	0	0	0	19	0	0	0	15	0
ALB	0	0	0	26	0	0	26	0	8	11
BOS	0	0	0	0	0	0	0	23	0	0
MDW	0	0	0	23	28	0	0	15	8	23
CLE	0	0	0	0	0	0	0	0	0	0
BAL	0	0	0	0	0	0	0	0	18	21
TAL	0	0	0	0	0	28	0	0	0	0
CVG	0	0	0	0	0	0	0	26	12	11
LOU	0	0	0	0	0	0	0	9	0	13
JFK	0	0	0	0	0	0	0	24	19	17
PIT	0	0	0	25	26	0	0	15	16	14

PREDICTOR 121

	CIG					VIS				
STATION	4	7	10	13	16	4	7	10	13	16
SAV	0	0	0	0	0	0	0	0	0	0
MSY	0	0	0	14	0	0	0	12	9	0
RAL	0	0	0	20	18	0	0	14	17	0
DCA	0	0	0	0	0	0	0	0	0	0
ATL	0	0	0	19	24	0	0	28	16	0
BHM	0	0	17	10	8	0	0	22	15	9
KNO	0	0	0	0	0	0	0	0	0	0
BNA	0	0	29	20	17	0	23	0	0	0
STL	0	0	0	19	16	0	0	29	11	11
BUF	0	0	0	0	0	0	0	0	0	0
ALB	0	0	0	0	22	0	0	10	0	0
BOS	0	0	0	0	0	0	0	0	13	0
MDW	0	0	0	0	0	0	0	0	0	0
CLE	0	0	0	0	21	0	0	0	0	0
BAL	0	0	0	0	0	0	0	18	0	0
TAL	0	0	25	15	22	0	0	19	10	0
CVG	0	0	0	24	10	0	0	0	0	0
LOU	0	0	0	12	11	0	23	0	7	0
JFK	0	0	0	0	0	0	0	0	0	0
PIT	0	0	0	0	0	0	0	0	0	0

PREDICTOR 122

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 15
SAV	0	0	0	0	0	28	0	22	0	8
MSY	0	0	0	0	0	0	25	24	11	0
RAL	0	0	0	0	0	0	0	0	0	0
DCA	0	0	0	0	0	0	0	8	13	27
ATL	0	0	0	0	0	0	0	0	0	0
BHM	0	0	0	0	0	0	30	0	20	0
KNO	0	0	0	0	17	29	24	11	10	22
BNA	0	0	0	16	19	0	15	7	22	0
STL	0	0	0	0	0	0	0	17	9	0
BUF	0	0	0	0	0	0	0	0	23	0
ALB	0	0	0	0	0	0	16	8	9	17
BOS	0	0	0	0	0	0	0	22	0	0
MDW	0	0	0	0	0	0	0	0	18	27
CLE	0	0	0	0	0	0	0	26	0	0
BAL	0	0	0	0	0	0	21	16	0	0
TAL	0	0	0	0	19	0	0	0	0	8
CVG	0	0	0	0	17	0	0	8	5	15
LOU	0	0	0	0	0	0	0	0	0	0
JFK	0	0	0	0	29	0	24	16	16	0
PIT	0	0	0	26	0	0	14	7	17	30

PREDICTOR 123

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	29	0	0	22	0	0	0
MSY	0	0	0	0	0	0	0	0	0	22
RAL	0	18	17	25	0	0	22	16	22	0
DCA	0	0	0	0	0	0	0	0	0	0
ATL	0	16	12	13	30	0	0	17	18	0
BHM	0	12	10	13	29	0	0	9	0	0
KNO	0	0	23	11	0	0	0	0	0	0
BNA	0	26	14	0	0	0	0	0	0	0
STL	0	0	26	20	0	0	0	0	3	24
BUF	0	0	0	0	28	0	0	0	0	26
ALB	0	0	0	27	0	0	0	0	0	0
BOS	0	0	0	0	0	0	0	0	12	0
MDW	0	0	0	0	0	0	0	0	0	0
CLE	0	0	0	26	25	0	0	0	0	0
BAL	0	0	0	0	0	0	0	0	0	0
TAL	0	16	10	25	0	0	12	20	14	0
CVG	0	29	14	20	0	0	0	0	0	0
LOU	0	23	13	11	19	0	15	6	6	0
JFK	0	0	0	0	0	0	0	0	0	0
PIT	0	0	0	0	0	0	0	0	0	0

PREDICTOR 134

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	23	0	0	0	0	0	0
MSY	0	0	0	0	0	0	0	0	0	0
RAL	0	0	0	0	0	10	6	0	0	0
DCA	0	0	0	0	0	0	25	0	0	9
ATL	0	0	0	0	0	0	0	0	0	0
BHM	0	0	27	0	0	0	26	0	0	13
KNO	0	0	0	0	0	0	15	19	9	11
BNA	0	0	0	23	21	25	0	0	16	0
STL	0	0	0	0	0	0	0	0	10	0
BUF	0	0	0	0	17	0	0	0	13	17
ALB	0	0	0	0	0	19	0	15	7	9
BOS	0	0	0	0	0	0	0	0	0	0
MDW	0	0	0	24	27	0	0	27	5	7
CLE	0	0	0	0	22	0	0	0	0	26
BAL	0	0	0	0	0	0	0	0	0	20
TAL	0	0	0	0	0	0	30	0	11	0
CVG	0	0	0	0	0	0	9	0	0	0
LOU	0	0	0	0	0	0	0	0	14	20
JFK	0	0	0	0	0	25	20	0	0	0
PIT	0	0	0	0	24	10	5	0	15	12

PREDICTOR 137

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	23	0	0	21	20	0
MSY	0	0	0	25	0	0	0	0	0	0
RAL	0	30	0	22	19	0	0	13	19	0
DCA	0	0	0	13	9	0	0	30	12	0
ATL	0	0	0	16	12	0	0	27	14	21
BHM	0	0	0	12	12	0	0	27	21	0
KNO	0	0	0	14	14	0	0	0	0	0
BNA	0	0	0	0	0	0	0	16	0	0
STL	0	0	0	21	21	0	0	30	0	10
BUF	0	0	0	0	0	0	0	0	0	0
ALB	0	0	0	11	0	0	0	0	0	0
BOS	0	0	0	0	0	0	0	24	11	0
MDW	0	0	0	0	0	0	0	0	0	0
CLE	0	0	0	0	0	0	23	0	0	0
BAL	0	0	0	28	19	0	0	19	21	0
TAL	0	0	23	26	25	0	0	18	0	0
CVG	0	0	0	0	14	0	0	0	16	12
LOU	0	0	0	0	14	0	0	21	0	0
JFK	0	0	0	0	17	0	0	0	14	10
PIT	0	0	0	17	0	19	0	21	0	0

PREDICTOR 138

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	21	0	0	0	0	0	0	0	0	0
MSY	0	29	0	0	0	0	0	0	0	0
RAL	15	0	0	0	0	0	0	0	0	0
DCA	21	10	0	0	0	0	0	0	26	0
ATL	20	0	0	0	0	0	0	0	0	0
BHM	0	13	0	0	0	0	0	0	0	0
KNO	0	23	0	0	0	0	0	0	0	0
BNA	0	22	11	0	0	0	0	23	25	0
STL	18	10	10	13	0	0	0	22	0	23
BUF	0	18	21	29	30	0	0	0	24	0
ALB	28	15	13	17	0	0	0	0	0	0
BOS	23	17	0	0	0	0	0	0	0	0
MDW	29	15	10	12	25	0	0	0	0	0
CLE	0	0	14	19	19	0	0	29	0	0
BAL	0	19	15	30	0	0	0	0	0	0
TAL	0	0	0	0	0	0	0	0	0	0
CVG	0	28	0	27	0	0	0	0	27	0
LOU	24	12	15	0	0	0	0	24	26	0
JFK	25	22	0	0	0	0	0	26	0	0
PIT	0	19	15	22	0	0	0	0	0	0

PREDICTOR 139

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	20	11	20	0	0
MSY	0	0	0	0	0	0	9	0	0	0
RAL	0	27	0	0	0	0	0	0	0	0
DCA	0	0	0	0	13	0	6	5	7	0
ATL	0	0	0	0	0	0	30	0	0	0
BHM	0	0	0	0	0	0	0	0	0	0
KNO	0	29	0	0	12	15	5	4	5	10
BNA	0	0	19	0	0	0	9	6	14	0
STL	0	0	23	18	20	0	8	10	6	9
BUF	0	0	0	21	20	0	15	10	12	10
ALB	0	21	0	10	11	0	7	4	5	12
BOS	0	0	0	0	0	0	14	12	0	0
MDW	0	0	18	21	26	23	3	0	6	0
CLE	0	0	24	20	20	0	10	9	22	16
BAL	0	0	17	14	18	25	7	0	10	10
TAL	0	0	0	0	0	0	0	0	0	0
CVG	0	0	0	0	0	0	6	5	4	7
LOU	0	0	0	0	0	0	6	4	4	0
JFK	0	0	0	0	0	0	9	5	0	0
PIT	0	0	16	14	25	10	3	2	7	13

PREDICTOR 140

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	0	0	29	0
MSY	0	0	0	0	0	0	0	0	0	0
RAL	0	17	16	23	25	22	19	12	16	0
DCA	0	0	19	28	0	12	0	15	0	0
ATL	0	30	20	26	0	22	21	21	0	0
BHM	0	0	26	27	0	0	21	15	0	0
KNO	0	0	0	17	0	0	0	0	0	0
BNA	0	0	0	24	0	11	0	0	0	0
STL	0	0	0	0	0	20	24	0	0	0
BUF	0	0	0	0	0	0	0	0	0	0
ALB	0	0	25	0	0	15	23	0	0	0
BOS	0	0	0	0	0	0	11	29	0	0
MDW	0	0	0	0	0	10	21	23	0	0
CLE	0	0	0	0	0	0	22	0	15	0
BAL	0	0	0	0	0	15	30	0	0	0
TAL	0	0	0	0	0	0	0	0	0	0
CVG	0	0	0	0	20	16	23	0	0	0
LOU	0	0	0	0	30	11	0	0	0	0
JFK	0	0	0	0	0	0	23	0	15	0
PIT	0	0	0	0	0	0	0	0	0	0

PREDICTOR 141

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	20	14	11	20	0	0	0	18	0
MSY	0	0	0	23	0	0	0	0	25	0
RAL	0	9	8	10	23	26	12	8	15	0
DCA	0	18	9	9	0	0	0	0	0	0
ATL	0	9	9	8	20	21	16	9	13	20
BHM	0	10	3	9	13	0	14	6	18	6
KNO	0	0	9	10	0	0	[illegible]	0	0	0
BNA	0	0	0	10	18	0	0	[illegible]	0	0
STL	0	0	0	0	0	0	0	0	0	0
BUF	0	0	0	0	0	0	0	0	0	0
ALB	0	0	10	0	0	0	0	0	0	0
BOS	0	30	20	0	0	0	0	0	10	0
MDW	0	0	0	0	0	0	0	0	0	0
CLE	0	0	0	0	0	0	0	30	0	0
BAL	0	0	0	0	0	0	0	0	0	0
TAL	0	28	9	16	23	0	16	17	8	0
CVG	0	0	10	10	13	0	0	0	0	0
LOU	0	0	11	7	12	0	0	0	0	14
JFK	0	0	22	0	0	0	0	0	8	18
PIT	0	0	0	0	0	0	0	0	0	0

PREDICTOR 145

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	28	0	0	0	27	21	0
MSY	0	0	0	26	0	0	0	0	10	0
RAL	0	0	0	0	0	[illegible]	0	28	23	0
DCA	0	0	0	0	0	1.	12	0	0	0
ATL	0	0	0	0	0	0	0	0	0	0
BHM	0	0	28	19	15	0	0	0	23	[illegible]
KNO	0	0	0	0	21	0	16	0	13	0
BNA	0	0	0	26	22	0	0	21	20	0
STL	0	0	0	26	25	0	0	6	14	0
BUF	0	0	0	0	0	0	0	0	0	0
ALB	0	0	0	25	21	29	0	0	16	13
BOS	0	0	0	0	0	22	17	0	0	0
MDW	0	0	0	26	30	0	0	0	14	0
CLE	0	0	0	0	0	0	0	0	0	0
BAL	0	0	0	0	0	0	0	0	0	0
TAL	0	0	0	28	0	0	0	0	12	0
CVG	0	0	0	0	0	0	17	0	0	0
LOU	0	0	0	0	23	0	0	0	18	0
JFK	0	0	0	0	0	30	0	0	0	21
PIT	0	0	0	28	27	25	23	26	29	15

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PREDICTOR 148

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	30	30	24	23	30	0	5
MSY	0	0	0	0	0	0	0	0	0	14
RAL	0	0	0	0	0	0	30	[illegible]	0	0
DCA	0	0	0	0	0	0	0	0	0	6
ATL	0	0	16	20	0	0	0	23	20	0
BHM	0	0	20	28	0	0	0	21	25	0
KNO	0	0	0	0	0	27	26	16	17	0
BNA	0	0	0	30	0	0	22	18	0	0
STL	0	0	0	28	0	0	0	0	17	0
BUF	0	0	0	0	0	0	0	0	0	0
ALB	0	0	0	30	15	0	17	13	0	7
BOS	0	0	0	0	0	0	0	25	0	11
MDW	0	0	0	0	0	0	0	0	0	0
CLE	0	0	0	0	0	0	0	0	0	0
BAL	0	0	0	0	0	0	20	0	0	0
TAL	0	0	0	27	0	0	15	25	0	5
CVG	0	0	0	0	0	0	0	14	15	0
LOU	0	0	0	0	0	0	24	10	17	0
JFK	0	0	0	0	0	0	25	19	0	0
PIT	0	0	0	27	0	0	13	8	19	0

PREDICTOR 170

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	0	0	0	0
MSY	1	18	14	16	0	0	0	5	23	20
RAL	0	0	0	0	0	0	0	0	0	0
DCA	9	5	14	11	26	0	0	0	0	0
ATL	8	7	3	2	2	11	7	0	19	0
BHM	9	5	15	5	3	0	0	0	0	0
KNO	0	0	0	26	0	0	0	0	0	0
BNA	0	0	0	0	0	0	0	0	0	0
STL	0	19	9	3	3	8	29	2	8	27
BUF	0	0	27	9	10	0	0	0	0	0
ALB	0	0	0	23	28	0	0	0	0	0
BOS	6	2	2	2	2	0	3	14	3	0
MDW	0	0	21	8	5	0	26	0	0	0
CLE	0	0	16	8	7	0	0	0	0	0
BAL	8	15	13	8	16	0	0	0	0	0
TAL	0	0	0	0	0	0	0	0	0	0
CVG	0	9	12	9	16	0	18	17	0	0
LOU	0	22	12	5	16	0	0	25	0	0
JFK	7	6	19	0	0	16	0	0	0	0
PIT	0	23	0	0	0	0	0	0	0	0

PREDICTOR 175

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	0	0	0	0
MSY	0	0	0	0	0	0	0	0	0	0
RAL	0	0	0	0	0	0	0	0	0	0
DCA	0	12	0	0	0	27	17	21	0	0
ATL	27	0	0	0	0	29	17	22	29	18
BHM	24	28	25	30	0	20	17	25	0	0
KNO	0	21	22	0	20	0	25	0	0	0
BNA	0	0	18	12	15	0	0	19	0	0
STL	17	11	7	5	11	21	0	19	21	7
BUF	29	30	0	0	0	0	0	0	0	0
ALB	18	23	11	13	10	0	13	14	13	0
BOS	11	15	0	16	15	13	10	10	0	0
MDW	13	6	4	3	3	0	17	0	0	0
CLE	23	16	13	12	14	0	24	0	0	0
BAL	0	0	0	25	0	30	15	15	19	0
TAL	0	0	0	0	17	0	29	0	0	0
CVG	0	27	0	12	11	23	0	25	11	22
LOU	17	11	9	0	10	0	0	0	0	0
JFK	12	0	0	0	14	18	28	17	0	0
PIT	0	0	0	0	0	0	0	10	0	0

PREDICTOR 190

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	10	12	27	0	0	27	29	24	17	0
MSY	14	30	0	0	0	0	0	0	0	0
RAL	10	15	11	12	16	0	13	20	13	0
DCA	22	0	0	0	0	0	0	0	0	0
ATL	0	12	13	14	0	14	8	7	10	14
BHM	25	0	0	0	0	0	0	29	0	0
KNO	0	22	28	0	19	0	0	0	0	0
BNA	0	0	21	18	0	0	16	13	12	12
STL	22	30	25	29	0	0	30	23	0	0
BUF	0	0	0	0	0	0	0	0	0	0
ALB	0	0	9	12	20	0	24	20	0	0
BOS	0	0	0	0	0	0	0	0	0	0
MDW	23	22	25	0	0	0	0	25	0	0
CLE	15	0	0	0	0	0	0	0	0	0
BAL	0	30	29	0	0	27	0	0	0	0
TAL	0	0	0	0	0	0	0	0	0	0
CVG	0	28	19	13	12	0	26	11	23	20
LOU	0	0	0	0	0	0	0	0	0	0
JFK	15	15	14	0	0	13	6	10	0	0
PIT	29	20	0	29	30	0	0	0	0	0

PREDICTOR 191

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	0	0	0	0	0	0	0	0	0
MSY	0	0	0	0	0	0	0	0	30	0
RAL	0	0	12	24	0	0	20	9	20	0
DCA	0	27	21	17	0	0	0	0	0	0
ATL	25	0	0	0	0	0	0	0	0	0
BHM	0	0	0	0	0	19	0	0	0	0
KNO	0	0	0	0	0	0	0	0	0	0
BNA	0	18	28	29	14	0	0	0	0	25
STL	25	0	0	0	15	0	0	0	28	0
BUF	0	0	0	0	0	0	0	0	0	20
ALB	0	0	0	0	0	30	9	5	14	26
BOS	0	0	0	0	0	0	13	11	7	22
MDW	0	0	0	0	0	0	0	0	0	0
CLE	0	0	0	0	0	0	0	0	0	0
BAL	0	0	0	27	0	0	26	13	24	0
TAL	24	29	27	0	0	0	0	0	0	0
CVG	27	0	0	0	0	0	0	23	24	29
LOU	0	27	28	0	0	0	0	27	0	0
JFK	0	0	30	0	30	0	17	8	13	27
PIT	0	0	18	15	0	0	22	4	24	0

PREDICTOR 197

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	0	23	7	10	0	0	0	0	0	0
MSY	0	0	0	17	0	0	0	0	0	0
RAL	24	10	7	0	0	0	4	15	0	0
DCA	0	7	7	0	0	6	0	0	0	0
ATL	14	10	10	25	0	15	0	0	0	9
BHM	0	0	7	21	0	0	2	0	0	0
KNO	0	0	0	0	0	11	0	0	0	0
BNA	0	0	0	0	0	0	4	0	0	0
STL	0	0	0	17	24	0	4	11	0	0
BUF	0	0	0	0	0	0	0	0	0	0
ALB	0	0	0	0	0	0	0	0	0	0
BOS	0	0	0	9	13	7	5	0	0	28
MDW	0	0	0	0	0	7	0	0	0	0
CLE	0	0	25	0	0	10	0	0	0	0
BAL	0	0	9	0	0	6	0	0	0	0
TAL	0	0	30	0	0	0	0	0	0	0
CVG	0	0	0	0	0	7	3	0	0	0
LOU	0	0	0	0	0	10	0	0	0	0
JFK	0	0	0	0	18	3	3	0	0	0
PIT	0	0	0	0	0	3	0	0	0	0

PREDICTOR 232

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	7	5	4	2	2	9	2	2	2	3
MSY	0	0	2	3	3	4	3	7	1	6
RAL	0	8	3	7	17	30	0	0	0	16
DCA	0	17	6	7	6	17	0	17	0	10
ATL	10	8	7	10	19	3	10	11	5	0
BHM	0	7	6	5	5	0	0	12	3	2
KNO	10	9	0	0	4	0	0	0	0	0
BNA	0	0	0	0	0	21	0	0	0	0
STL	28	8	0	0	17	0	0	0	0	0
BUF	0	11	19	8	13	0	0	0	0	0
ALB	21	9	8	7	0	0	0	0	0	0
BOS	0	7	5	4	4	0	0	0	0	7
MDW	0	0	0	20	0	0	0	0	0	0
CLE	0	0	12	0	0	0	0	0	0	0
BAL	0	8	23	19	0	5	0	11	7	0
TAL	11	8	6	3	5	0	0	13	0	0
CVG	0	17	8	17	28	19	16	4	0	0
LOU	0	0	0	8	17	0	0	0	30	0
JFK	4	8	12	0	0	0	0	0	0	0
PIT	0	29	0	0	0	0	0	0	0	0

PREDICTOR 269

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	26	0	12	0	0	4	13	5	11	0
MSY	30	0	0	0	0	0	0	0	0	0
RAL	13	20	27	0	8	12	2	2	2	7
DCA	12	8	16	0	0	29	8	9	0	0
ATL	0	0	0	0	4	0	2	18	2	2
BHM	0	0	0	0	24	0	11	4	0	0
KNO	0	17	5	8	0	0	7	2	2	4
BNA	9	10	12	0	0	28	13	4	0	0
STL	9	0	0	0	0	16	19	13	0	0
BUF	12	5	8	0	0	10	6	8	0	0
ALB	0	0	0	0	0	0		0	0	0
BOS	17	0	0	0	0	0	0	0	0	0
MDW	0	0	0	0	0	0	0	0	0	0
CLE	27	0	0	0	29	12	19	17	0	0
BAL	21	18	4	3	0	21	3	6	0	0
TAL	0	18	22	0	0	0	0	0	4	7
CVG	6	11	0	0	0	10	4	0	0	0
LOU	25	0	20	25	26	12	5	3	13	0
JFK	18	17	24	0	0	0	0	0	0	0
PIT	10	9	7	4	4	9	9	28	0	0

PREDICTOR 284

STATION	CIG 4	CIG 7	CIG 10	CIG 13	CIG 16	VIS 4	VIS 7	VIS 10	VIS 13	VIS 16
SAV	5	3	5	9	27	0	3	0	0	0
MSY	5	2	4	19	0	7	2	2	0	0
RAL	6	4	6	17	0	0	3	19	0	0
DCA	10	9	15	0	0	13	7	12	28	0
ATL	9	3	6	30	0	0	4	6	0	0
BHM	11	4	9	0	0	0	23	0	30	24
KNO	0	16	0	0	0	0	0	0	0	0
BNA	0	6	17	13	11	27	17	11	0	0
STL	0	5	28	30	0	0	0	0	0	0
BUF	7	13	6	0	0	11	24	28	0	0
ALB	16	0	6	0	0	0	21	0	0	0
BOS	13	11	22	0	0	14	7	21	0	0
MDW	0	13	5	9	0	0	0	0	13	0
CLE	7	12	0	0	0	15	13	0	0	0
BAL	9	4	6	0	26	14	2	7	0	26
TAL	6	3	5	12	0	0	3	3	0	0
CVG	0	3	4	14	0	0	2	3	0	0
LOU	0	7	6	0	0	0	30	0	0	6
JFK	16	13	0	0	28	15	14	0	0	0
PIT	23	4	12	9	0	0	0	6	0	9

	PREDICTOR 298										PREDICTOR 315									
	CIG					VIS					CIG					VIS				
STATION	4	7	10	13	16	4	7	10	13	16	4	7	10	13	16	4	7	10	13	16
SAV	0	0	0	0	0	3	7	0	14	28	0	0	24	4	4	0	0	0	0	13
MSY	8	6	0	0	0	3	4	0	0	25	0	0	26	23	0	0	0	0	0	0
RAL	9	7	0	29	20	2	8	0	9	23	0	6	14	3	2	9	16	22	4	2
OCA	23	15	0	0	0	10	9	25	0	0	0	3	3	2	2	8	5	2	9	0
ATL	25	12	0	0	0	9	11	0	0	12	0	0	0	0	0	25	[illegible]	0	0	6
BHM	9	24	0	0	0	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0
KNO	6	4	4	0	0	5	4	27	0	0	0	0	0	0	0	0	0	0	15	7
BNA	12	7	5	0	0	2	3	0	0	30	0	0	0	0	0	0	0	12	9	9
STL	12	14	0	0	0	6	13	0	0	0	0	0	0	0	0	0	0	0	0	15
BUF	26	0	24	25	0	7	7	25	0	0	0	0	13	13	6	0	0	20	10	7
ALB	4	4	0	0	0	4	5	0	0	0	0	0	24	19	23	0	0	0	0	0
BOS	27	0	0	19	23	10	25	0	0	0	0	0	0	7	0	0	0	0	0	0
MON	6	6	0	0	0	5	13	0	0	0	0	0	0	0	0	0	0	0	0	0
CLE	12	0	0	28	0	6	7	0	0	0	0	0	0	0	18	0	0	0	0	0
BAL	16	10	0	18	0	8	8	0	22	0	5	9	5	4	3	9	12	29	11	7
TAL	4	4	15	0	0	1	1	0	0	25	0	0	12	9	0	0	0	0	0	0
CVG	7	16	13	26	0	5	7	0	0	0	0	0	0	0	7	0	0	0	3	4
LOU	12	14	22	0	0	6	4	0	0	0	0	0	0	27	7	0	0	0	5	2
JFK	0	0	0	18	0	27	5	0	24	26	0	2	2	6	3	0	0	27	27	14
PIT	8	10	9	0	0	4	4	0	0	0	0	0	17	24	29	0	0	0	0	0

APPENDIX F

DEFINITION OF VERIFICATION SCORES

This appendix defines the Brier P-score, Allen utility score, and percent correct.

It is desirable that statements of the probability of a weather event be reliable; that is, over a period of time the event should actually occur with the frequency implied by the probability forecast. It is also desirable that the probabilities be as close to zero or to 100 percent as possible when the event does not occur or does occur, respectively. The Brier P-score (P) (Brier, 1950) measures these two characteristics of probability forecasts and is given by

$$P = \frac{1}{N} \sum_{j=1}^{r} \sum_{i=1}^{N} \left(f_{ij} - E_{ij} \right)^2 \qquad \text{(F1)}$$

where on each of N occasions an event can happen in only one of r possible classes, and f_{i1}, f_{i2}, ... f_{ir} represent the forecast probabilities that the event will occur in classes 1, 2, ..., r, respectively. If the r classes are chosen to be mutually exclusive and exhaustive,

$$\sum_{j=1}^{r} f_{ij} = 1 \qquad \text{(F2)}$$

for each and every $i = 1, 2, \ldots N$. E_{ij} takes the value 1 or 0 according, respectively, to whether the event occurred in class j or not. For perfect forecasting, the Brier P-score will have a value of zero and, for the worst possible forecasting, a value of two.

The percent correct (PC) of the total number of forecasts is computed by

$$PC = \frac{\text{Sum of correct forecasts}}{\text{Total number of forecasts}} \times 100, \qquad \text{(F3)}$$

The computation of a utility score involves the use of a utility matrix. A utility matrix essentially shows a series of weighting factors which are meant to represent the usefulness or utility of forecasts to the user.

The utility matrix used in this study and shown in Table F1 was devised by R. A. Allen after consultation with forecasters at several aviation forecast centers. The matrix may not be too different from that of an

actual utility matrix of an airline, and it has been used by Enger et al. (1962) in evaluating ceiling height forecasts at seven terminals.

Inspection of Table F1 shows that a correct forecast of category one receives a weight of 1.0, while a correct forecast of category five is given a weight of only .15. Also, a near miss such as a forecast category one when category two is observed is weighted by .7. The Allen utility score (AUS) is given by

$$AUS = \sum_{j=1}^{5} \sum_{i=1}^{5} W_{ij} \quad Z_{ij}, \qquad (F4)$$

where W represents the weights shown in Table F1 and Z represents the values in the corresponding boxes of a 5 by 5 forecast-observed contingency table. This score therefore has the following characteristics: a) more credit is given for correct forecasts of the lower, more operationally significant, ceiling categories than for correct forecasts in higher categories, and b) some credit is given for near misses.

Table F1. The Allen Utility Matrix Used to Judge the Usefulness of Ceiling and Visibility Forecasts.

Observed Category	Forecast Category				
	1	2	3	4	5
1	1.0	0.6	0.1	0.0	0.0
2	.7	.9	.4	.05	.0
3	.2	.5	.7	.2	.0
4	.0	.1	.3	.45	.1
5	.0	.0	.05	.1	.15